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National Defense Research Institute

AN
OBJECTIVES-BASED
APPROACH TO
MILITARY CAMPAIGN
ANALYSIS

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Bruce Pirnie ♦ Sam B. Gardiner

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PREFACE

This report records work accomplished during the project "Defining Conflict Elements as a Framework for Theater Analysis." A primary objective of this study was to help the Warfighting Analysis Division, J-8, identify key elements in military campaigns, especially those associated with command, control, communications, and intelligence (C³I). The study identified key elements as missions of combatant commanders, operational objectives, and tasks within a comprehensive framework. The study used Desert Shield/Desert Storm as a paradigm for analysis and evaluation of military campaigns using this framework.

Primarily of interest to persons concerned with analysis of military campaigns, this report should also be of interest to those concerned with an objectives-based approach to military affairs.

This work was performed within the International Security and Defense Policy Center of RAND's National Defense Research Institute (NDRI), a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, and the defense agencies. Comments should be directed to the authors or to Greg Treverton, Director of the International Security and Defense Policy Center.

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SUMMARY

Analysis of objectives offers the best approach to understanding military affairs and especially military campaigns. Objectives guide decisions at every level from the national command authority to junior officers engaged in combat.

HIERARCHY OF OBJECTIVES

Levels of War

U.S. and NATO doctrine distinguishes three levels of war: strategic, operational, and tactical. At the strategic level, the highest-level decisionmakers, acting unilaterally or within an alliance or coalition, strive to attain national security objectives and national military objectives. Many strategic decisions generate missions for combatant commanders that link the strategic and operational levels. High-level commanders contribute to the development of strategy by advising on the feasibility of missions. At the operational level, these commanders conduct campaigns and major operations. At the tactical level, commanders and other military personnel fight battles and engagements. Figure S.1 displays the levels of war with objectives superimposed.

Cognition at Each Level

At each level, decisionmakers perform certain broadly defined cognitive processes. At the highest level resides strategy, a vision of

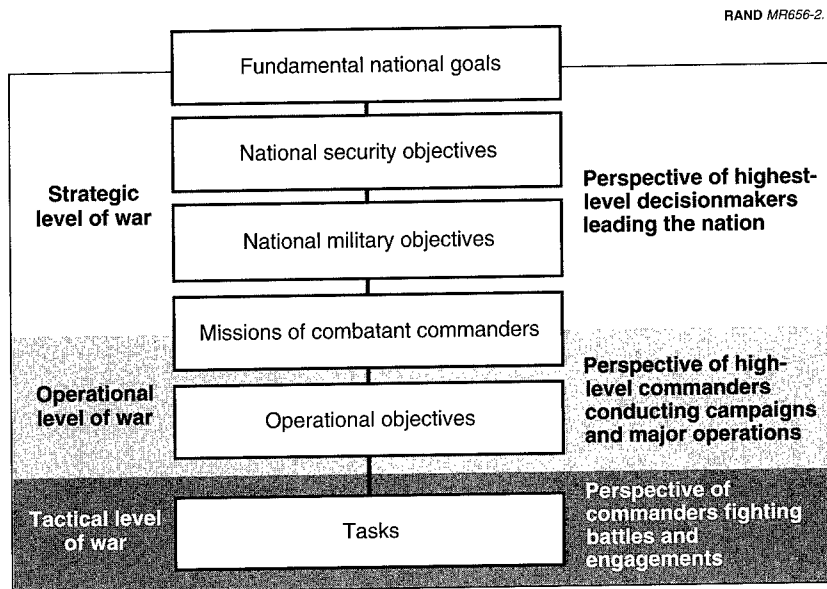


Figure S.1—Levels of War

events that taken together would make progress toward or accomplish national objectives. Development of strategy is a highly intuitive process that involves not only tangible aspects of national power but also intangible aspects, including the moral and spiritual dimensions of American life. At the next level is operational art, more precisely the art and science of conducting military campaigns and major operations. At the lowest level are tactics, which comprise the methods and techniques of combat, conveyed through training and enriched or modified by recent experience. Figure S.2 displays cognition at each level with objectives superimposed.

Objectives at Each Level

Objectives at each level are associated with a source or actor and defined by their function within the hierarchy. Fundamental national goals are rooted in the nation's history and express the national character. Americans generally believe that their country's funda-

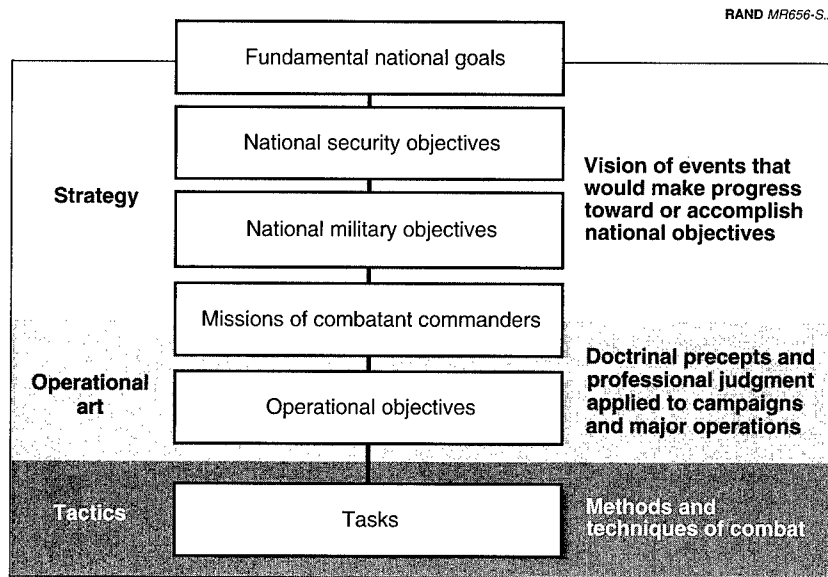


Figure S.2—Cognition at Each Level

mental goals have transcendent value and reveal a unique historical destiny. National security objectives are formulated by an administration, usually influenced by congressional and public opinion. The implied national military objectives are set by the national command authority (NCA) with assistance from the Chairman of the Joint Chiefs of Staff (CJCS) acting as principal military advisor. Combatant commanders are usually commanders in chief (CINCs) of unified commands or commanders of joint task forces but may be at lower levels, for example in the case of special operations. Tasks are tactical-level objectives that will contribute to attaining operational objectives. Figure S.3 defines objectives in a comprehensive hierarchy extending from fundamental national goals to tasks performed in combat.

OPERATIONAL OBJECTIVES

A combatant commander attains operational objectives within a concept of operations or a campaign plan to accomplish his mission.

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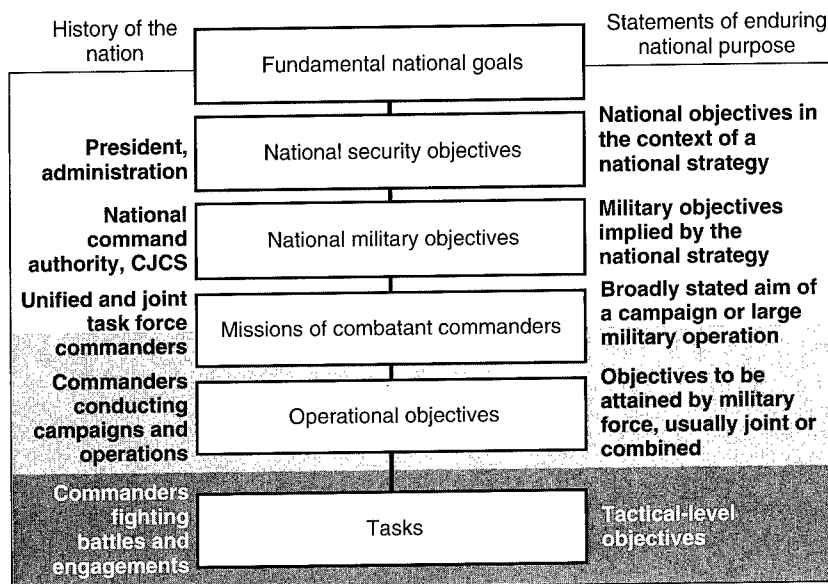


Figure S.3—Objectives at Each Level

Operational objectives can be formulated generically for broad planning purposes or specifically in the context of scenarios and actual operations. For example, to accomplish his mission, the U.S. Commander in Chief, Central Command (USCINCCENT), wanted to gain air superiority, an objective that might be formulated generically as “dominate opposing operations in the air” or specifically as “dominate opposing operations in the airspace of the Kuwaiti Theater of Operations.”

Operational objectives can be defined in numerical terms or understood in terms of relative advantage. For example, the objective “dominate opposing operations in the air” can be defined as numbers of surviving forces, or understood as relative advantage—the advantage of exploiting airspace while denying its use to an opponent. These different methods may lead to different assessments, as illustrated by the air phase of Desert Storm. Viewed in the form of a relative advantage, the coalition dominated the air from the first day of offensive operations. But Iraq kept a residual capability to

challenge the coalition if Iraq launched its surviving aircraft simultaneously. In view of this capability, USCINCCENT claimed only "air superiority" from the outset. He waited until 27 January (D+10) to declare "air supremacy," when he judged that the Iraqi air forces lost the capability to present a serious threat.

Operational objectives are usually achieved through joint and combined, rather than through single-service, operations. For example, "suppress opposing air defense," a task associated with "dominate opposing operations in the air," is not uniquely associated with air forces, as illustrated in Desert Storm.

Objectives fall into three categories: (1) combat related, (2) combat supporting, and (3) other. Combat-related objectives imply the destruction of enemy forces or the threat of their destruction. Combat-supporting objectives call for the provision of means or the creation of advantageous conditions. In addition, combatant commanders may be ordered to attain other objectives that are not related to combat. The following set of operational objectives is not the only possible set and may not be the best possible set, but it is reasonably comprehensive and consistent:

Combat-Related Objectives

- Dominate opposing operations in the air.
- Dominate opposing operations at sea and exploit sea at will.
- Force entry into a region.
- Degrade opposing stocks and infrastructure.
- Dominate opposing operations on land and operate at will.
- Counter opposing weapons of mass destruction.
- Deny opposing operations in space and exploit space at will.
- Protect lives of U.S. citizens abroad.
- Counter terrorists opposing the United States and its allies.
- Participate in noncoercive peace operations.
- Participate in coercive peace operations.

Combat Supporting Objectives

- Deploy combat-ready forces to host countries.
- Sustain forward-deployed forces.
- Dominate the cognitive environment.
- Enhance capabilities of U.S. friends and allies.
- Maintain peacetime military presence.
- Establish an effective coalition.
- Establish infrastructure to sustain forward-deployed forces.

Other Objectives

- Provide humanitarian and disaster relief at home and abroad.
- Counter production and traffic in illegal drugs.

TASKS

Tasks are tactical-level objectives that must be attained to accomplish operational objectives. A task should not be defined as an activity but rather as an objective so that a commander can measure or evaluate progress toward attaining it. For example, "conduct air defense suppression" is an activity that could imply any level of effort. By contrast, "suppress opposing air defense" is an objective whose attainment can be measured or evaluated in terms of surviving enemy capabilities or resistance encountered by friendly aircraft flying in enemy airspace.

Tasks should also be defined so that commanders can select the most effective and appropriate employment concept and that force planners can devise new concepts. For example, "suppress opposing air defense" allows examination of the relative importance and effectiveness of electronic countermeasures, air base attack, radar-homing munitions, wide-area submunitions, etc.

APPLYING THE FRAMEWORK

While structured hierarchically, operational objectives and tasks are also related to each other horizontally. Some of these relationships are well understood, while others are more uncertain. Operational objectives also help define the phases of a campaign.

Relating Operational Objectives

Operational objectives are related in that progress toward one objective assists in attaining another objective or objectives. An overview of some relationships is shown in Figure S.4.

This overview outlines major relationships among some objectives in a generic campaign. The ability to deploy forces allows a commander to attain the required degree of air supremacy and sea control. Sustainment of deployed forces is critical to airspace supremacy and in defeating enemy maneuver forces. Dominating opposing operations in the air and at sea helps in dominating the cognitive environment by suppressing an opponent's reconnaissance means while

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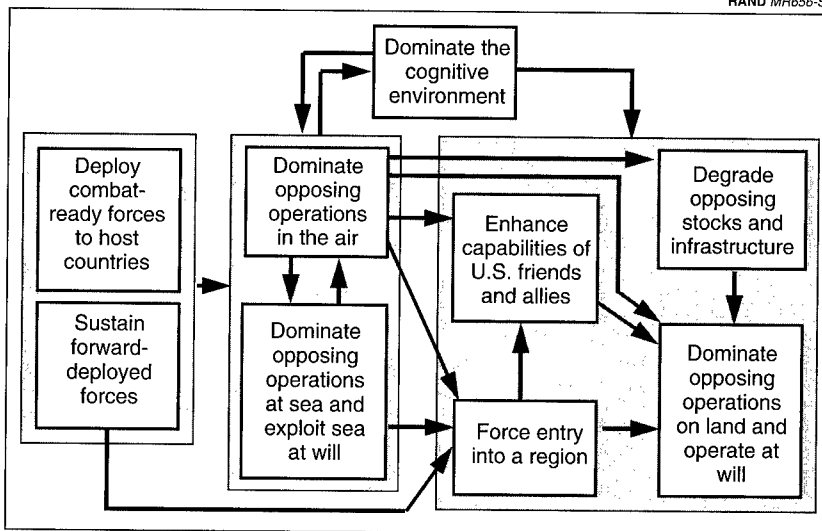


Figure S.4—Overview of Operational Objectives

securing friendly means. A commander exploits his cognitive advantage to accomplish all other objectives in his campaign. Domination of opposing operations in the air helps enhance the capabilities of U.S. allies and also helps to degrade opposing stocks and infrastructure. Domination of opposing operations in the air and at sea contributes directly to forced entry, including airborne, heliborne, and amphibious assault. Degradation of opposing stocks and infrastructure helps to dominate opposing operations on land.

Understanding Relationships

Some relationships are well understood as outputs from one objective and inputs to other objectives. For example, "deploy combat-ready forces" can be expressed as force levels, typically Time-Phased Force Deployment (TPFD) for maneuver forces, that become inputs to other objectives. Other relationships are subject to gross uncertainties, are poorly understood, or are so dependent upon highly variable situations that evaluation is extremely difficult. For example, "dominate the cognitive environment" affects dominance in the air and at sea in a developing situation, but these relationships are so dependent on multiple variables and change so rapidly over time that the effects can only be roughly evaluated.

None of the relationships between cognitive dominance and other operational objectives are well understood, although they can be roughly evaluated by expert judgment. Indeed, it may be extremely difficult to assess the impact of cognitive dominance even after a campaign has concluded with full access to the records of both sides. As an example, consider the difficulty in assessing the impact of Ultra during World War II, recalling that Ultra was just one source of intelligence collection.¹ This statement does not imply that there is no value in analyzing the objective and its impact on a campaign, only that one should not expect definite, well-understood inputs to the other objectives. Dominating the cognitive environment (or "winning the information war") is well worth considering and will often provide an important advantage for U.S. forces, but its effects can be evaluated only in very rough terms.

¹Ultra was a British codeword for intelligence derived from decrypting the Enigma cipher used by the Germans during World War II.

Phases of a Campaign

The commander devises a concept of operations or campaign plan that usually includes phasing. Each phase is characterized by attainment of operational objectives within specific times and areas of operations or by progress toward their attainment. These objectives are related to each other by a concept of operations, and each phase may have its own concept. Typically, each phase develops preconditions to initiate the succeeding phase.

COGNITIVE DOMINANCE A KEY OBJECTIVE

Expressions such as "C³I," "information war," and even "command and control warfare" do not capture the full dimensions and importance of dominating the cognitive environment. Cognitive dominance is not an intelligence function nor the province of specialists in electronics. The struggle for cognitive dominance is inherently two-sided, involves a wide variety of combat actions, and can have decisive effects. It is waged at every level of war from strategic decisions to individual encounters in combat. At the operational level, cognitive dominance should be a major focus of command interest and thoroughly integrated into operational planning.

This objective should not be envisioned as satellites spinning through a silent void, nor as computers humming softly as they process unimaginable amounts of data, nor as graphic displays that give war the aspect of a video game. Rather, it should be envisioned as U.S. commanders in full mastery of complex situations confronting enemy commanders who know little of U.S. operations and are losing control over their own forces. It should be envisioned as U.S. commanders who see almost perfectly overmatching enemy commanders who are nearly blind. For example, it should be envisioned as General H. Norman Schwarzkopf confronting the Iraqi officers at Safwan. Cognitive dominance could be a key objective for U.S. commanders, especially if their forces are outnumbered in some future contingency.

EXPLOITATION OF ADVANTAGES

An objectives-based approach focuses attention on command decisions that create and exploit advantages. Few wars of any kind, and no wars that involve U.S. forces, will be decided by linear battles and attrition. On the contrary, U.S. commanders will normally select objectives and sequence accomplishment to exploit their own strengths and enemy vulnerabilities. Far from being chivalrous, they will ruthlessly exploit every advantage within the bounds of international law and constraints set by the national command authority.

The Persian Gulf campaign can be understood as a series of stratagems to negate the only important Iraqi strength: large numbers of heavy ground forces. Initially, the coalition exploited its dominance at sea to blockade Iraq, enforcing economic sanctions imposed by the Security Council. After ensuring the defense of Saudi Arabia, the coalition exploited dominance in the air to destroy targets throughout Iraq and Kuwait with increasing concentration on Iraqi ground forces. The coalition easily repulsed an Iraqi attack that may have been intended to precipitate a ground war prematurely. Finally, the coalition dominated land operations by outflanking Iraqi forces in Kuwait and preventing their reinforcement. In these ways, the coalition exploited its advantages while denying Iraq opportunities to employ its heavy ground forces.

OTHER APPLICATIONS OF OBJECTIVES-BASED FRAMEWORK

The approach developed in this report has several applications, including

- analyzing campaigns (focus of this study)
- developing strategy
- preparing war plans
- allocating resources
- modernizing forces.

Developing Strategy

Strategists set the highest-level objectives and envision how to accomplish them. To understand what can be accomplished through military force, they must look at the underlying operational level, normally through the professional advice of the CJCS and combatant commanders. In several instances, including Desert Storm, the link between strategy and operational art has been weak. It would be strengthened if civilian and military leaders shared a common understanding of objectives.

Preparing War Plans

War plans are designed to implement strategy within a political-military context bounded by assumptions. War planners derive their overall objectives from national strategy, but they must look at the underlying tactical level to evaluate feasibility. While planning at the operational level, they must comprehend objectives (and capabilities) at levels above and below their own; in other words, they need a comprehensive understanding of a hierarchy of objectives.

Allocating Resources

Resource allocation decisions reflect informed judgment on the most cost-effective and prudent way to allocate scarce resources among competing defense programs. These decisions are affected by such considerations as preservation of an industrial base, effect on the nation's economy, and sunk costs, which are not directly related to military operations. But the fundamental rationale is to provide capabilities needed to accomplish tasks and to attain objectives.

Modernizing Forces

Strategic planners set the demand for modernization by identifying operational requirements. To fulfill these requirements, joint and service conceivers frame concepts at the operational level, the tactical level, and the level of weapons systems (tank, ship, aircraft, etc.). Top-level decisionmakers evaluate competing concepts and decide which concepts to implement, implying program starts and initial re-

source allocation decisions. The fundamental rationale is to improve capability to accomplish objectives.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the assistance of RAND colleagues Bruce Bennett, John Bondanella, Dan Fox, Glenn Kent, Walt Perry, John Schrader, David Shlapak, and David Thaler in developing the first draft. Glenn's pioneering work in objectives-based planning provided the intellectual foundation for this project. In addition, Glenn generously contributed his time to critique various aspects of the project. Roger Brown and Fred Frostic offered thoughtful, constructive reviews of the first draft. Each reviewer brought his own expertise to the task and so each suggested different changes. Within the time constraints of the project, we adopted most of their major suggestions.

The initial project memorandum would have terminated the study had David Chu not taken an interest. David believed that the draft should be turned into a report and made additional funds available for reviews by Richard Kugler and Arthur Bullock. Richard recommended that we recast introductory material and several key findings to focus the reader's attention on the study's central message, one that transcends its original purpose. Arthur provided a highly detailed critique that prompted several important corrections.

At this point, Paul Davis reviewed the draft report and saw that the proposed framework cut across RAND projects and therefore required broader participation. Paul guided an internal debate that generated a consensus among analysts currently interested in an objectives-based approach. Among those participating in this debate were Tim Bonds, Arthur Bullock, Robert Howe, Glenn Kent, Richard Kugler, John Schrader, and David Ochmanek. Following this

debate, Bruce Pirnie and John Schrader summarized the results and circulated them for comment from the participants. Luetta Pope prepared the final draft for publication. The authors thank their editor, Christina Pitcher, for her excellent work in preparing this document for publication. Of course, the authors are responsible for errors.

LIST OF ACRONYMS AND ABBREVIATIONS

ABCCC	Airborne Battlefield Command and Control Center [EC-130E]
ACE	Armored Combat Earthmover
ACR	Armored Cavalry Regiment
APS	Afloat Prepositioning Ships
ASCM	anti-ship cruise missile
ASW	anti-submarine warfare
ATACMS	Army Tactical Missile System
ATF	amphibious task force
ATGM	Anti-Tank Guided Missile
ATO	Air Tasking Order
AWACS	Airborne Warning and Control System [E-3B/C]
BAT	Brilliant Anti-Armor Submunition
BDA	bomb damage assessment
C ³ I	command, control, communication, and intelligence
C ³ IC	Coalition Coordination, Communication, and Integration Center
CAP	combat air patrol

CAS	close air support
CBU	cluster bomb unit
CINC	commander in chief
CINCCFC	Commander in Chief, Combined Forces Command
CJCS	Chairman of the Joint Chiefs of Staff
CNN	Cable News Network
CRAF	Civil Reserve Air Fleet
CVBG	carrier battle group
DARPA	Defense Advanced Research Projects Agency
DIA	Defense Intelligence Agency
DPRK	Democratic People's Republic of Korea
DSP	Defense Support Program
ECM	electronic countermeasures
FAC	forward air controller
FLIR	forward-looking infrared
FMS	foreign military sales
FSS	Fast Sealift Ships
G-Day	First day of the ground offensive against Iraq
GCC	Gulf Cooperation Council
GPS	Global Positioning System
HARM	High-Speed Anti-radiation Missile [AGM-88]
IAEA	International Atomic Energy Agency
IVIS	Inter-Vehicular Information System
JFACC	Joint Force Air Component Commander
JSOW	Joint Stand-Off Attack Weapon
JSTARS	Joint Surveillance and Target Attack Radar System [E-8A]

JTIDS	Joint Tactical Information Distribution System
KTO	Kuwait Theater of Operations
LANTIRN	low altitude navigation and targeting infrared for night
LCAC	Landing Craft Air Cushion
LOSAT	line-of-sight anti-tank
MEB	Marine Expeditionary Brigade
MEF	Marine Expeditionary Force
MLRS	Multiple-Launch Rocket System
MPS	Maritime Prepositioning Ships
NATO	North Atlantic Treaty Organization
NCA	national command authority
OODA	observation-orientation-decision-action
ROK	Republic of Korea
RRF	Ready Reserve Force
SA	Selective Availability [of GPS]
SADARM	Sense and Destroy Armor Submunition
SAM	surface-to-air missile
SAS	Special Air Service
SEAD	suppression of enemy air defense
SEAL	Sea-Air-Land [Navy SOF]
SF	Special Forces
SFW	Sensor Fused Weapon
Shrike	anti-radiation missile [AGM-45]
SOF	special operations forces
TLAM	Tomahawk Land Attack Missile [BGM-109]
TPFD	Time-Phased Force Deployment

UAE	United Arab Emirates
UAV	unmanned aerial vehicle
USCINCCENT	United States Commander in Chief, Central Command
WMD	weapons of mass destruction

Chapter One

INTRODUCTION

KEY ELEMENTS

The original objective of this study was to help Warfighting Analysis Division, J-8, identify key elements in campaigns, especially those associated with command, control, communications, and intelligence (C³I). The study was intended to be a high-level conceptual exploration that might lead to simple quantification of relationships among key elements. In the end, we identified key elements, but we could not quantify their relationships in any simple fashion. On the contrary, we found that some important relationships, especially the relationship of C³I to other key elements, cannot be easily understood. These relationships demand complex evaluation and ultimately subjective judgment by domain experts. In this sense, the project produced a negative finding: Important high-level relationships, especially those associated with C³I, are complicated and cannot be simplified without distortion.

FOCUS ON OBJECTIVES

Rather than dwell on a negative finding, we concentrated effort on constructing a framework that would assist campaign analysis, including some insight into the pervasive effects of C³I, and also place military campaigns in the broader context of national objectives. This framework is based on the principle of the objective, viewed first hierarchically and then laterally as well.

The objective, i.e., directing effort toward a defined and attainable outcome, is the first principle of war. It is a universally accepted truism to say that commanders at every level should direct their efforts toward objectives, ranging from deterrence of thermonuclear war, and hence survival of American society, to rescue of a U.S. citizen from some dangerous part of the world. But truisms are exactly what must be continually rediscovered and applied.

We were surprised to discover that the first principle of war has not been rigorously applied in the literature. There were imprecision and minor confusion in terminology, even within doctrinal literature. There was no readily available and widely accepted framework to organize objectives in a comprehensive way. There was no established set of objectives to analyze campaigns generically. Even RAND, an institution with impressive experience in developing and using an objectives-based approach, had not produced a comprehensive framework of objectives. What initially seemed an easy first step proved unexpectedly difficult. Nor are we under any illusions that our research has attained definitive results. On the contrary, we believe this study only lays the groundwork for applying the first principle of war in a rigorous and systematic way.

OBJECTIVES-BASED APPROACH

Analysis of objectives offers the best approach to understanding military affairs and especially military campaigns. Objectives guide decisions at every level from the national command authority to junior officers engaged in combat.

HIERARCHY OF OBJECTIVES

Levels of War

U.S. and NATO doctrine distinguishes three levels of war: strategic, operational, and tactical.¹ At the strategic level, the highest-level decisionmakers, acting unilaterally or within an alliance or coalition, strive to attain national security objectives and national military objectives. The most important strategic decisions, e.g., President Roosevelt's decision to defeat the Axis Powers, contribute to the fundamental goals that express the national character. Many strategic decisions generate missions or objectives for combatant commanders. These missions, normally expressed in political-military terms, link the strategic and operational levels. High-level commanders usually advise on the feasibility of missions and thus contribute to development of strategy. At the operational level, these commanders and their immediate subordinates conduct campaigns and major operations. At the tactical level, commanders and other military per-

¹See Appendix A for definitions of each level and its associated terms.

sonnel fight battles and engagements. Figure 2.1 displays the levels of war with objectives superimposed.

Cognition at Each Level

At each level, decisionmakers perform certain broadly defined cognitive processes. At the highest level resides strategy, a vision of events that taken together would make progress toward or accomplish national objectives. Development of strategy is a highly intuitive process that involves not only tangible aspects of national power but also intangible aspects, including the moral and spiritual dimensions of American life. Strategy concerns not only actions of the United States and its allies, but also domestic opinion and actions of other states, including those of antagonists and adversaries. At the next level is operational art, more precisely the art and science of conducting military campaigns and major operations. Operational art proceeds from doctrinal precepts, such as the long-

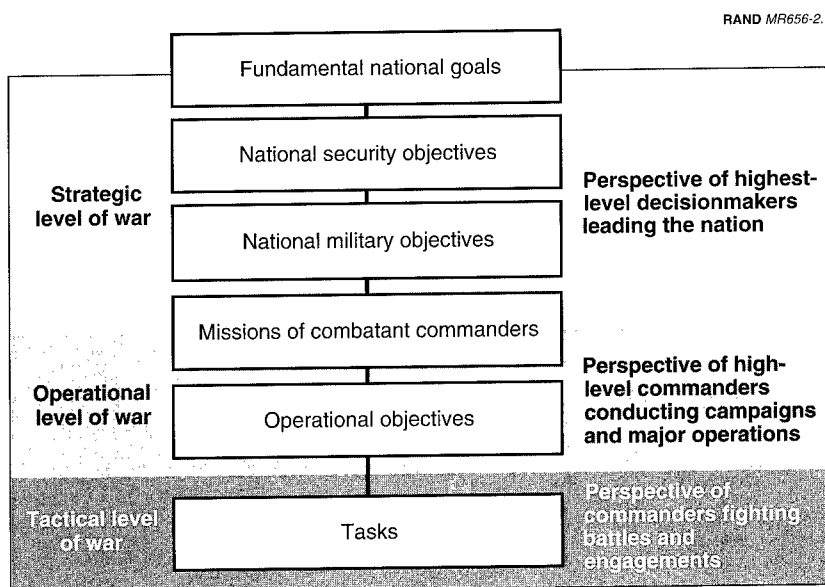


Figure 2.1—Levels of War

accepted principles of war,² and from professional judgment based on experience of large operations and special knowledge of the area of operations. At the lowest level are tactics, which comprise the methods and techniques of combat, conveyed through training and enriched or modified by recent experience. Tactics also follow the principles of war, although within a lesser scope than operational art, but they are generally more sensitive to the introduction of new weapons and equipment than operational art is. Figure 2.2 displays cognition at each level with objectives superimposed.

Objectives at Each Level

Objectives at each level are associated with a source or actor and defined by their function within the hierarchy. Fundamental national

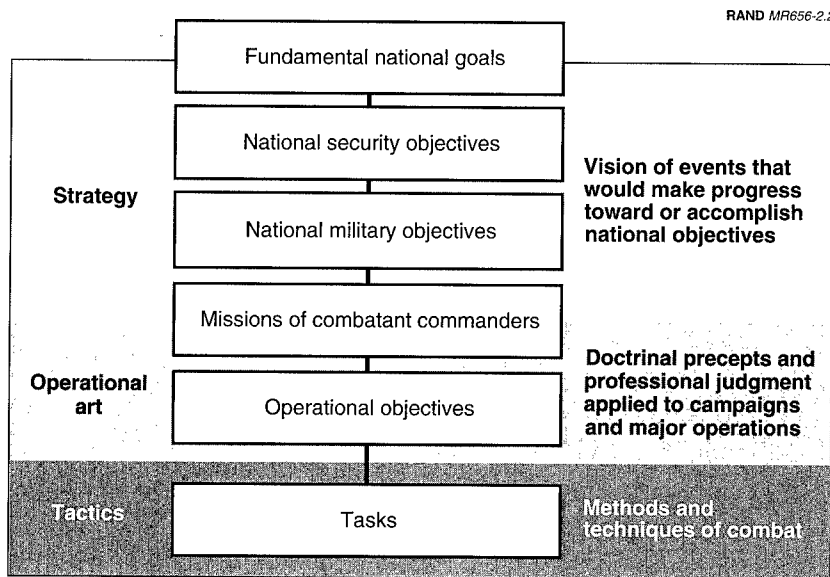


Figure 2.2—Cognition at Each Level

²These long-accepted principles are objective, offensive, mass, economy of force, maneuver, unity of command, security, surprise, and simplicity. See U.S. Army, 1993, pp. 2-4 to 2-6, and U.S. Air Force, 1992, pp. 9-15. This entire study may be understood as a commentary on the first principle of war.

goals are rooted in the nation's history and express the national character. Americans generally believe that their country's fundamental goals have transcendent value and reveal a unique historical destiny. National security objectives are formulated by an administration, usually influenced by congressional and public opinion. The implied national military objectives are set by the national command authority (NCA) with assistance from the Chairman of the Joint Chiefs of Staff (CJCS) acting as principal military advisor. Combatant commanders are usually commanders in chief (CINCs) of unified commands or commanders of joint task forces but may be at lower levels, for example in the case of special operations. Tasks are tactical-level objectives that will contribute to attaining operational objectives. Figure 2.3 defines objectives in a comprehensive hierarchy extending from fundamental national goals to tasks performed in combat.

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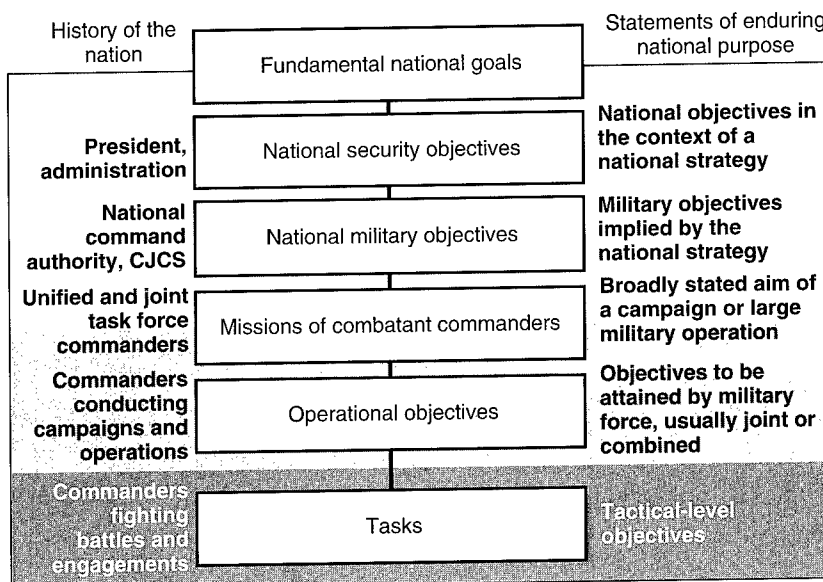


Figure 2.3—Objectives at Each Level

FUNDAMENTAL NATIONAL GOALS

Fundamental national goals are articulated in documents of historical importance such as the Declaration of Independence, the Constitution, the Gettysburg Address, and the Atlantic Charter.

The Declaration of Independence signed in Congress on 4 July 1776 declares:

We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty, and the pursuit of Happiness. That to secure these rights Governments are instituted among Men, deriving their just powers from the consent of the governed.

The Constitution approved in Convention on 17 September 1787 sets forth these purposes in the preamble:

form a more perfect Union, establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty.

Speaking on 19 November 1863 to consecrate the national cemetery at Gettysburg, President Lincoln gave his understanding of the historical purpose of the Union. His speech has become “an authoritative expression of the American spirit—as authoritative as the Declaration itself, and perhaps more influential.”³ The Gettysburg Address begins:

Fourscore and seven years ago our fathers brought forth on this continent, a new nation, conceived in Liberty, and dedicated to the proposition that all men are created equal.

It concludes with a resolution:

that this nation, under God, shall have a new birth of freedom—and that government of the people, by the people, for the people, shall not perish from the earth.

³Wills, 1992 pp. 146, 147.

Meeting off the coast of Newfoundland on 14 August 1941, President Roosevelt and Prime Minister Churchill, issued the Atlantic Charter, subsequently approved by the United Nations (wartime coalition),⁴ that included the following (paraphrased):

- right of all peoples to choose their form of government
- access by all states on equal terms to trade and raw materials
- assurance that men live in freedom from want and fear
- traversing the high seas without hindrance
- abandonment of the use of force.

NATIONAL SECURITY OBJECTIVES

National security objectives are an administration's broad political, military, and economic objectives intended to secure the nation and to advance its interests. These objectives often carry over from one administration to another and may endure for decades, but will change with the geopolitical environment. They are formally articulated in the national security strategy, which encompasses the following:⁵

Enhance Our Security

- Maintain a strong defense capability.
- Decide when and how to employ U.S. forces.
- Combat spread and use of weapons of mass destruction (WMD) and missiles.
- Support arms control.

⁴The coalition against the Axis Powers was formally constituted on 1 January 1942 through the Declaration of the United Nations signed by China, Great Britain, the United States, the Union of Soviet Socialist Republics, and 22 other states. The Declaration of the United Nations begins "having subscribed to a common program . . . known as the Atlantic Charter." This coalition led directly to establishment of the permanent international organization of the same name.

⁵White House, 1994.

- Participate in multilateral peace operations.
- Maintain strong intelligence capabilities.
- Protect and improve the environment.

Promote Prosperity at Home

- Enhance American competitiveness.
- Create partnership between business and labor.
- Enhance access to foreign markets.
- Strengthen macroeconomic coordination.
- Provide energy security.
- Promote sustainable development abroad.

Promote Democracy

- Cooperate with other democracies on security and economic issues.
- Enlarge community of democratic and free-market nations.

Attain Regional Security Objectives

- Attain objectives in Europe and Eurasia.
- Attain objectives in East Asia and the Pacific region.
- Attain objectives in the western hemisphere.
- Attain objectives in the Middle East, South Asia, and Southwest Asia.
- Attain objectives in Africa.

NATIONAL MILITARY OBJECTIVES

National military objectives are a subset of national security objectives and are linked to political and economic objectives. An admin-

istration's national military objectives are articulated inter alia in the national security strategy and defense planning guidance. In its current version,⁶ the national security strategy implies the following objectives:

Promote Stability

- Maintain military-to-military contacts.
- Provide assistance to friendly nations.
- Provide security assistance.
- Conduct humanitarian operations.
- Counter illegal drugs and terrorism.
- Participate in peacekeeping.
- Deter nuclear attack.
- Maintain regional alliances.
- Support arms control.
- Initiate confidence-building measures.

Thwart Aggression

- Set clear objectives and employ decisive force.
- Respond during crises.
- Evacuate endangered noncombatants.
- Enforce sanctions.

⁶Chairman, Joint Chiefs of Staff, 1994, presents two "national military objectives": promote stability and thwart aggression. He describes two "strategic concepts": overseas presence and power projection, that apply to both objectives. He provides a detailed discussion of three "components of the strategy": peacetime engagement, deterrence and conflict prevention, and fight and win. These "components of the strategy" appear to be an escalatory sequence, from day-to-day peacetime activities ("peacetime engagement") to crisis ("deterrence and conflict prevention") to war ("fight and win"). For this analysis, we have omitted an escalatory sequence and associated each of the subsumed items directly under the most appropriate national military objective.

- Conduct peace enforcement.
- Project power during wartime.
- Fight as combined and joint forces.
- Win the information war.
- Counter weapons of mass destruction.
- Be prepared for two nearly simultaneous major regional contingencies.
- Generate forces.
- Win the peace.

MISSIONS OF COMBATANT COMMANDERS⁷

Missions of combatant commanders express the intent of the national command authority usually communicated through the Joint Chiefs of Staff. In a specific situation, missions are usually expressed in broad political-military terms, e.g., compel Iraqi forces to leave Kuwait and restore the legitimate government, allowing combatant commanders to discern implied objectives. Expressed generically, the missions of the combatant commanders include the following:

Deter and Defeat Attacks on the United States

Protecting the nation from attack is always a vital interest. For the foreseeable future, the most serious threats of direct attack will arise from weapons of mass destruction (WMD). Other emerging threats may include attacks on U.S. information systems or degradation of common world resources.

Proliferation of WMD and associated delivery means is almost certain during the coming two decades. Delivery means could include covert forms, such as smuggling weapons into the United States. Hostile states and subnational actors will probably seek WMD to deter U.S. involvement and to constrain U.S. options during regional

⁷This exposition of generic missions is extracted from unpublished RAND research by David A. Ochmanek, Stephen T. Hosmer, and John Bordeaux.

crises and conflicts. To deter attacks, U.S. forces should be capable of retaliating in a devastating manner, inflicting unacceptable damage on any attacker. In addition, U.S. forces should be capable of limiting the damage caused by attacks on U.S. territory, including attacks by ballistic or cruise missiles and aircraft.

Deter and Defeat Aggression Against U.S. Allies, Friends, and Interests

U.S. vital interests may be threatened by overt aggression. Aggression can take the form of large-scale, combined arms offensives or assertions of sovereignty that threaten freedom of transit and other uses of the seas, air, or space. Theater-level warfare will continue to be the dominant factor sizing and shaping the overall U.S. military force posture. Because the United States has vital interests in several regions and because those interests may be threatened by several potential enemies, the United States must be prepared to cope with two nearly simultaneous aggressions. This requirement is demanding because

- the United States has interests in distant regions
- forward-deployed U.S. forces cannot defeat large-scale aggression
- warning may be in hours or ambiguous
- U.S. deployment may be constrained by denial of transit routes and lack of bases
- opponent may possess WMD and accurate delivery means
- U.S. military operations may be further constrained by
 - desire to avoid provoking use of WMD
 - potential U.S. casualties and collateral damage
 - fragile cohesion of a U.S.-led coalition
 - risks of widening conflict.

Protect the Lives of U.S. Citizens in Foreign Locations

The U.S. government must protect its citizens abroad. To fulfill this responsibility, U.S. forces may be ordered to evacuate endangered U.S. citizens, rescue U.S. citizens held hostage, and defend in situ U.S. citizens under attack. U.S. forces may be called upon to undertake these operations in several countries simultaneously and without the permission or support of local governments.

Foster Regional Stability

To foster regional stability, the following may be required of U.S. forces.

- Prevent the coercion of friends and promote a stable balance of power. Routine presence of U.S. forces in a region, both by stationing and by temporary deployments, demonstrates commitment to the security of U.S. allies. U.S. forces stationed or deployed abroad acquire familiarity with the operating environment and provide a basis for combined training with the forces of allied and friendly countries. Regional arms control efforts, as well as judicious sales and transfers of arms can also help maintain a stable balance.
- Help resolve regional or internal conflicts. U.S. forces can support efforts to allay inter- and intra-state conflicts. In conjunction with other states, U.S. forces may enforce arms embargoes and blockades or participate in peace operations, including peace enforcement under Chapter VII of the Charter of the United Nations. Alternatively, U.S. forces may intervene unilaterally or within a coalition.
- Defend threatened populations. U.S. forces may defend or support populations threatened by local groups, by their own government, or by a neighboring state.
- Assist friendly governments and bolster democracy. U.S. forces may render advice and assistance to friendly governments threatened by insurgency or lawlessness within their own borders.

An operation that is initially small-scale can impel the United States into major involvement. Moreover, even small-scale operations can generate major demands on U.S. resources over a long period of time. Therefore, U.S. decisionmakers should be prudent and selective when deciding to commit U.S. forces. Often, the United States makes critical contributions to multilateral military operations by providing assets such as strategic and tactical lift, specialized logistics support, reconnaissance, and communications capabilities, rather than combat forces.

Counter Regional Threats Involving Weapons of Mass Destruction

U.S. strategy contains a threefold approach to countering WMD in regional conflicts:

- Counter proliferation of WMD and delivery means. But the United States may have difficulty gaining international support for sanctions, even more for preemptive attacks.
- Reduce incentives to acquire WMD and deter their use by retaining the capability for devastating retaliation. But there may be moral and political constraints on retaliation.
- Develop capabilities to prevent use of WMD and limit their effects. Capabilities include counterforce attacks, multilayered defenses, and passive protection measures.

Deter and Counter State-Sponsored and Other Terrorism

States and subnational groups hostile to U.S. interests but reluctant to risk a military confrontation may use terrorism against U.S. citizens and property. The following may be required of U.S. forces:

- Protect U.S. personnel and facilities against terrorism overseas.
- Attack terrorist bases in retaliation or preemptively.
- Blockade and embargo states sponsoring terrorism.
- Conduct punitive attacks against states sponsoring terrorism.

States sponsoring terrorism will usually mask their involvement, making it difficult for the United States to conclusively assign responsibility for particular acts and to convince other governments of its findings. In such situations, it will be especially difficult to garner international support for preemptive or punitive attacks.

Provide Humanitarian and Disaster Relief at Home and Abroad

U.S. forces are frequently tasked to provide humanitarian and disaster relief. Civilian agencies and nongovernmental organizations can be overwhelmed by major disasters. U.S. forces have unique capabilities that may be urgently needed to ameliorate human suffering. Their tasks may include the following:

- Transport food, clothing, shelter, and other emergency supplies.
- Provide potable water, emergency communications, and medical services.
- Help repair damaged infrastructure.
- Provide physical security for relief personnel and endangered populations and facilities.

Counter Production and Trafficking in Illegal Drugs

For the past several years, U.S. forces have assisted law enforcement authorities at home and abroad in reducing the flow of illegal drugs into the United States. Interdiction of supplies is unlikely to significantly affect the market for illegal drugs in the United States.⁸ But rampant drug production and smuggling operations can threaten the stability of societies and governments, and therefore efforts to assist these governments are warranted. U.S. forces may be tasked to do the following:

- Collect and disseminate intelligence on the production and trafficking of illegal drugs.

⁸Reuter, 1988.

- Assist the forces of friendly countries in suppressing the production and trafficking of narcotics.
- Assist other U.S. government agencies in interdicting the importation of illegal drugs into the United States.

OPERATIONAL OBJECTIVES

A combatant commander attains operational objectives within a concept of operations or a campaign plan to accomplish his mission. Operational objectives can be formulated generically for broad planning purposes or specifically in the context of scenarios and actual operations. For example, to accomplish his mission, the U.S. Commander in Chief, Central Command (USCINCCENT), wanted to gain air superiority, an objective that might be formulated generically as “dominate opposing operations in the air” or specifically as “dominate opposing operations in the airspace of the Kuwaiti Theater of Operations (KTO) beginning on D-Day.”

Operational objectives can be defined in numerical terms or understood in terms of relative advantage. For example, the objective “dominate opposing operations in the air” can be defined as numbers of surviving forces, or understood as relative advantage, the advantage of exploiting airspace while denying its use to an opponent. These different methods may lead to different assessments, as illustrated by the air phase of Desert Storm. Viewed in the form of a relative advantage, the coalition dominated the air from the first day of offensive operations. But Iraq kept a residual capability to challenge the coalition if Iraq launched its surviving aircraft simultaneously. In view of this capability, USCINCCENT claimed only “air superiority” from the outset. He waited until 27 January (D+10) to declare “air supremacy,” when he judged that the Iraqi air forces lost the capability to present a serious threat.⁹

Operational objectives are usually achieved through joint and combined, rather than through single-service, operations. For example, “suppress opposing air defense,” a task associated with “dominate opposing operations in the air,” is not uniquely associated with air

⁹DoD, 1992, pp. 126–129.

forces, as illustrated by Desert Storm: At the outset of offensive air operations, special operations MH-53 Pave Low helicopters led AH-64 Apache helicopters with Hellfire to attack Iraqi air defense radar. On subsequent occasions, the Army Tactical Missile System (ATACMS) attacked Iraqi surface-to-air missile (SAM) sites.¹⁰

Operational objectives are usually two-sided in that both sides may try to attain the same objectives, although often in very dissimilar ways. During the Persian Gulf War, for example, the Iraqi leadership apparently intended to repel coalition forces by imposing unacceptably high casualties. The Iraqi concept of operations centered on static defensive positions backed by mobile armored reserves to contain breakthroughs. In contrast, USCINCCENT's concept involved strategic deception, flanking attack, breakthrough, and exploitation through rapid maneuver supported by air forces.

Objectives fall into three categories: (1) combat related, (2) combat supporting, and (3) other. Combat-related objectives imply the destruction of enemy forces or the threat of their destruction. Combat-supporting objectives call for the provision of means or the creation of advantageous conditions. In addition, combatant commanders may be ordered to attain other objectives that are not related to combat, i.e., there may be no requirement to destroy an enemy force. The following set of operational objectives is not the only possible set and may not be the best possible set, but it is reasonably comprehensive and consistent:

Combat-Related Objectives

- Dominate opposing operations in the air.
- Dominate opposing operations at sea and exploit sea at will.
- Force entry into a region.
- Degrade opposing stocks and infrastructure.
- Dominate opposing operations on land and operate at will.

¹⁰"Army Weaponry and Equipment," 1992, p. 257. On one occasion, an ATACMS unit received a mission while on the march, stopped, and quickly neutralized an SA-2 site. DoD, 1992, p. 218.

- Counter opposing weapons of mass destruction.
- Deny opposing operations in space and exploit space at will.
- Protect lives of U.S. citizens abroad.
- Counter terrorists acting against the United States and its allies.
- Participate in noncoercive peace operations (Chapter VI).¹¹
- Participate in coercive peace operations (Chapter VII).¹²

Combat-Supporting Objectives

- Deploy combat-ready forces to host countries.
- Sustain forward-deployed forces.
- Dominate the cognitive environment.
- Enhance capabilities of U.S. friends and allies.
- Maintain peacetime military presence.
- Establish an effective coalition.
- Establish infrastructure to sustain forward-deployed forces.

Other Objectives

- Provide humanitarian and disaster relief at home and abroad.
- Counter production and traffic in illegal drugs.

¹¹Noncoercive peace operations are conducted under Chapter VI of the Charter of the United Nations, implying that the peace force will not attempt to coerce belligerent parties. Rules of engagement (excepting unarmed observers) allow self-defense, which may result in combat. Depending on circumstances and the intent of the Security Council, self-defense may be interpreted narrowly or liberally, including for example use of close air support.

¹²Coercive peace operations are conducted under Chapter VII of the Charter of the United Nations, implying that the peace force will coerce belligerent parties if necessary to accomplish its mandate. An example of coercive peace operations is the NATO-led Implementation Force in Bosnia-Herzegovina.

TASKS

Tasks are tactical-level objectives that must be attained to accomplish operational objectives.¹³ A task should not be defined as an activity but rather as an objective so that a commander can measure or evaluate progress toward attaining it. For example, “conduct air defense suppression” is an activity that could imply any level of effort from the firing of a single high-speed anti-radiation missile (HARM) to a theaterwide effort extending throughout the campaign. By contrast, “suppress opposing air defense” is an objective whose attainment can be measured or evaluated in terms of surviving enemy capabilities or resistance encountered by friendly aircraft flying in enemy airspace.

Tasks should also be defined so that commanders can select the most effective and appropriate employment concept and that force planners can devise new concepts. For example, “suppress opposing air defense” allows examination of the relative importance and effectiveness of electronic countermeasures, air base attack, radar-homing munitions, wide-area submunitions, etc.

APPLYING THE FRAMEWORK

While structured hierarchically, operational objectives and tasks are also related to each other horizontally. Some of these relationships are well understood and quantifiable¹⁴ while others are more uncertain. Operational objectives also help define the phases of a campaign.

¹³See Appendix B for a complete list of tasks associated with operational objectives.

¹⁴Quantification implies measurement expressed in numbers and mathematical symbols. Broadly speaking, military analysis and models employ three kinds of quantification: (1) measurements of physical reality, e.g., geographic data, equipment counts, ranges of sensors and weapons; (2) numerical values derived from models of physical reality, e.g., equipment scores, probable kill for weapon/target pairings; and (3) numerical scores reflecting expert judgments, e.g., “highly proficient” is accorded a score of X, “moderately proficient” is accorded a score of Y, etc. Quantification of the first kind is unassailable if the measurement is accurate, but it is often inaccurate or contentious, especially concerning opposing forces. Quantification of the second kind typically involves methodology, assumptions, and deductions from experience that may not hold in all cases and are open to debate. There may not be enough empirical data about actual combat, much less actual campaigns, to ensure consensus about the second kind of quantification in each instance.

Relating Operational Objectives

Operational objectives are related in that progress toward one objective assists in attaining another objective or objectives. An overview of some relationships is shown in Figure 2.4.

This overview outlines major relationships among some objectives in a generic campaign. The ability to deploy forces allows a commander to attain the required degree of air supremacy and sea control. Sustainment of deployed forces is critical to airspace supremacy and in defeating enemy maneuver forces. Dominating opposing operations in the air and at sea helps in dominating the cognitive environment by suppressing an opponent's reconnaissance means while securing friendly means. A commander exploits his cognitive advantage to accomplish all other objectives in his campaign. Domination of opposing operations in the air helps enhance the capabilities of U.S. allies and also helps to degrade opposing stocks and infrastructure. Domination of opposing operations in the air and at sea contributes directly to forced entry, including airborne, heliborne, and

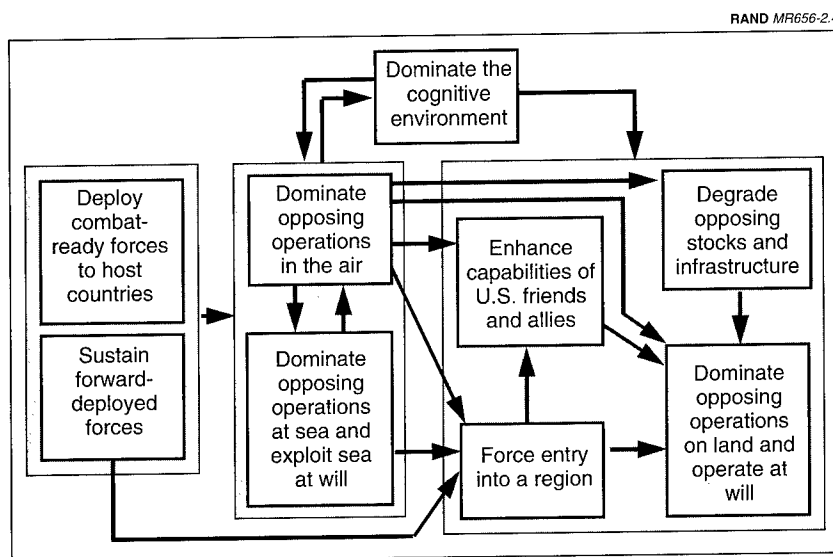


Figure 2.4—Overview of Operational Objectives

amphibious assault. Degradation of opposing stocks and infrastructure helps to dominate opposing operations on land.

Understanding Relationships

Some relationships are well understood as outputs from one objective and inputs to other objectives. For example, "deploy combat-ready forces" can be expressed as force levels, typically Time-Phased Force Deployment (TPFD) for maneuver forces, that become inputs to other objectives. Other relationships are subject to gross uncertainties, are poorly understood, or are so dependent upon highly variable situations that evaluation is extremely difficult. For example, "dominate the cognitive environment" affects dominance in the air and at sea in a developing situation, but these relationships are so dependent on multiple variables and change so rapidly over time that the effects can only be roughly evaluated.

None of the relationships between cognitive dominance and other operational objectives are well understood, although they can be roughly evaluated by expert judgment. Indeed, it may be extremely difficult to assess the impact of cognitive dominance even after a campaign has concluded with full access to the records of both sides. As an example, consider the difficulty in assessing the impact of Ultra during World War II, recalling that Ultra was just one source of intelligence.¹⁵ This statement does not imply that there is no value in analyzing the objective and its impact on a campaign, only that one should not expect definite, well-understood inputs to the other objectives. Dominating the cognitive environment (or "winning the information war") is well worth considering and will often provide an important advantage for U.S. forces, but its effects can be evaluated only in very rough terms.

There are also few well-understood relationships between degrading the opposing stocks and infrastructure and other objectives such as dominating opposing operations on land. Depending on the fragility of an opponent's war-making capacity, the dependence of his forces

¹⁵Ultra was a British codeword for intelligence derived from decrypting the Enigma cipher used by the Germans during World War II. See Bennett, 1989, pp. 354-364, for one assessment.

on reinforcement and resupply, and the duration of the conflict, attaining this objective will be more or less important, but evaluation will remain extremely difficult. The relationship between a country's economy and its military forces is not well understood, nor are the relationships among the elements of the economy itself. There are, of course, some obvious exceptions. For example, during a protracted conflict, an opponent's ability to manufacture more aircraft or more air defense weapons might have a direct, easily understood effect on the struggle for aerospace supremacy.¹⁶

The relationship between forced entry and dominance in land operations highlights an interesting problem. In the Pacific theater during World War II, forced entry and defeat of opposing forces were virtually synonymous. In the Korean conflict, amphibious assault had a dramatic effect that depended critically on timing and choice of objective area. General MacArthur's decision to conduct an amphibious assault at Inchon, opening the road to Seoul, just as the North Koreans became exhausted from repeated attacks on the Pusan perimeter was a stroke of genius. In Desert Storm, U.S. forces did not execute an amphibious assault, but the mere threat contributed to success by fixing Iraqi forces on the littoral. A review of such examples suggests that the relationship between forced entry and dominance in land operations is highly dependent on the operational situation and that quantification of the relationship between these objectives will remain elusive. Both these objectives are closely related to dominating the cognitive environment. For example, the Iraqis could not detect an amphibious assault until forces came ashore, but the Americans could detect Iraqi deployments and therefore know whether their deception was working.

Phases of a Campaign

The commander devises a concept of operations or campaign plan that usually includes phasing. Each phase is characterized by attainment of operational objectives within specific times and areas of operations or by progress toward their attainment. These objectives

¹⁶Other examples might be delay in redeploying forces caused by degradation of a transportation net or reduction in combat power caused by failure to supply critical items such as munitions and fuel.

are related to each other by a concept of operations, and each phase may have its own concept. Typically, each phase develops preconditions to initiate the succeeding phase.

At various times during a campaign, a commander will require more or less progress toward the same operational objective or new operational objectives. A commander marks progress toward accomplishing these objectives by establishing criteria. Meeting these criteria may prompt decisions to execute preplanned branches or to develop sequels not previously planned. For example, a commander may initially require defense of friendly airspace as a precondition for deployment. At a later stage of the campaign, he may require suppression of opposing air defense as a precondition for efforts to degrade opposing stocks and infrastructure. As another example, he may initially require control over sea-lanes to allow deployment of heavy forces and subsequently require neutralization of a littoral mine threat to allow an amphibious assault. If he fails to neutralize littoral sea mines, he may select a branch of his plan that reserves the amphibious assault force. Figure 2.5 illustrates progress toward related objectives in a generic campaign. Accomplishment of certain objectives may trigger the start of the next phase of a campaign. During Desert Storm for example, 50 percent degradation to Iraqi maneuver forces during the air phase was a decision point for beginning the ground phase.¹⁷

¹⁷In Schwarzkopf, 1992, p. 319, General Schwarzkopf (USA), USCINCCENT during the Persian Gulf Campaign, recalls selecting this goal during a conversation with Colonel John Warden (USAF) on Instant Thunder:

"Good, enough," I said. "Now after that, [destroying Iraqi air defenses] what if I wanted you to pound and weaken their army so that we could attack successfully?" Pulling a number out of the air, I said I'd need fifty percent of the Iraqi occupying forces destroyed before launching whatever ground offensive we might eventually plan.

According to Cohen, 1993a, this goal emerged from a U.S. Central Command staff study conducted in August and remained unchanged although an additional U.S. corps became available in November. It was originally defined to be 50 percent attrition to Iraqi ground forces, but redefined to be 50 percent reduction in combat effectiveness. Later, the criterion shifted from 50 percent of ground forces in the KTO to 50 percent of ground forces in the first echelon, presumed to present the greatest initial threat. How to evaluate combat effectiveness remained problematic.

How Coalition air power would achieve the "fifty percent solution" or even what it meant, became issues still exercising inter-service relations. It is still not clear, for example, how Schwarzkopf, himself, evaluated the battle damage assessments he received (Cohen, 1993a, p. 262).

The character and duration of phases vary extensively among campaigns. Desert Shield afforded a protracted preparation for the offensive air and ground phases of Desert Storm. By contrast, it is highly unlikely that the Democratic People's Republic of Korea (DPRK) would give sufficient warning to allow a comparable buildup of U.S. forces prior to the onset of offensive operations. Figure 2.6 gives an illustrative example of phases in a campaign by Republic of Korea (ROK) and U.S. forces in response to aggression from the DPRK.

In this illustrative example, phases are characterized by progress in attaining several operational objectives simultaneously. During the deterrence phase, the Commander in Chief, Combined Forces Command (CINCCFC), conducts operations that display the capabilities of his forces in an effort to persuade the DPRK leadership that aggression cannot succeed. During this phase, he might intensify intelligence collection, deploy additional U.S. forces to the region, conduct combined air operations in a demonstrative way, and take measures to ensure sea control in the event of hostilities. If deterrence failed, his mission would shift to the defense of the ROK. During this defensive phase, the objective of cognitive dominance would have new dimensions. The primary concern might be to disrupt and degrade DPRK collection capability and command entities that control high-speed offensive operations. Considering the poor quality of DPRK air and air defense forces, CINCCFC might expect to dominate opposing operations in the air very early in the defensive phase. If the DPRK possessed weapons of mass destruction, their destruction and suppression would be a pressing concern.

See also, DoD, 1992, pp. 314–315. The Defense Intelligence Agency (DIA) estimated that frontline divisions were less than 50 percent effective, while key Republican Guards divisions (Tawakalna and Al-Madinah) were 50–75 percent effective at the end of the air phase. Cohen, 1993a, pp. 41–44; Cohen, 1993b, p. 14; DoD, 1992, pp. 353–356; and Schwarzkopf, 1992, pp. 430–431, 439.

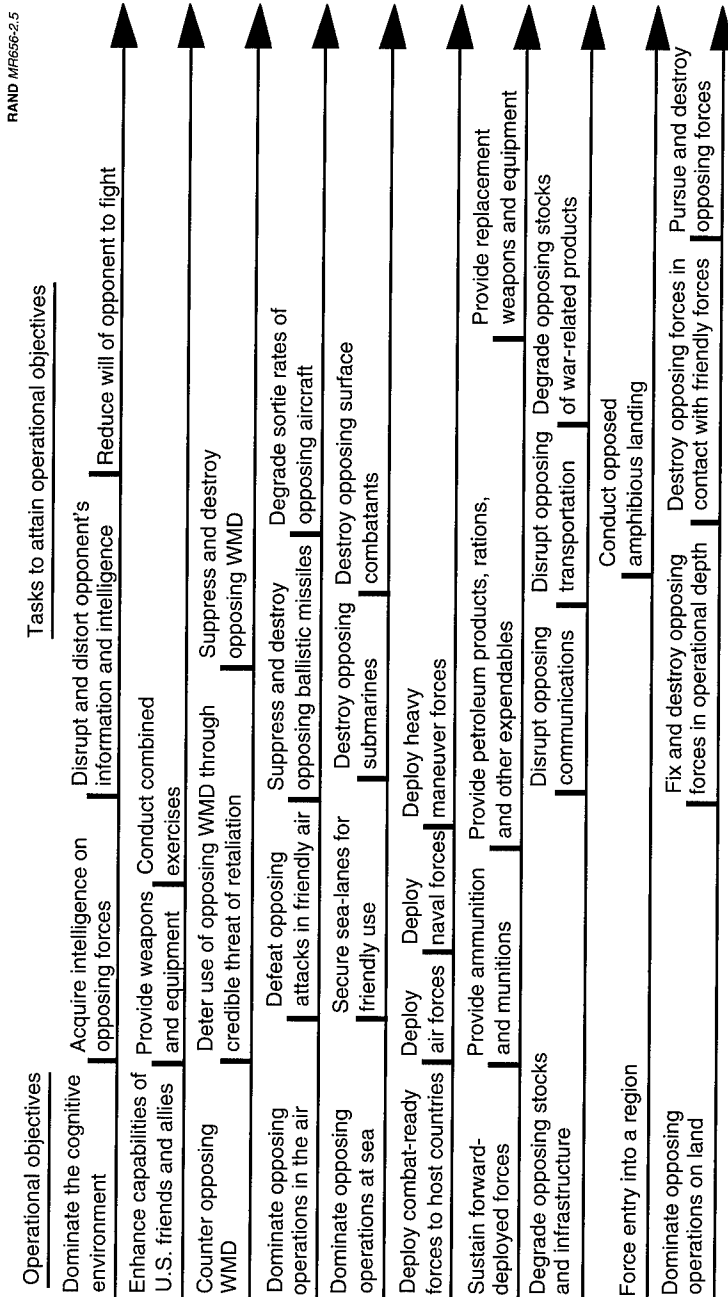


Figure 2.5—Progress Toward Objectives

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Operational objectives	Deterrence Phase	Defense Phase	Counteroffensive Phase
Dominate the cognitive environment	Acquire intelligence on North Korean and Chinese forces	Disrupt and distort North Korea's information and intelligence	Reduce will of North Koreans to fight
Enhance capabilities of U.S. friends and allies	Provide weapons and equipment; conduct combined exercises	Provide weapons and equipment	
Counter opposing WMD	Deter use of WMD through credible threat or retaliation	Suppress and destroy opposing WMD	
Dominate opposing operations in the air		Suppress and destroy ballistic and cruise missiles	Destroy opposing aircraft in flight
Dominate opposing operations at sea	Secure sea-lanes for friendly use	Destroy opposing submarines and surface combatants	Defeat air attacks on friendly naval forces
Deploy combat-ready forces to host countries	Deploy SOF, air forces, naval forces	Deploy air forces and heavy maneuver forces	
Sustain forward-deployed forces	Provide ammunition and munitions	Provide replacement weapons and equipment	Provide replacement personnel
Degrade opposing stocks and infrastructure		Disrupt communications and power generation	Degrade stocks of war-related products
Force entry into a region			Conduct opposed amphibious landing in North Korea
Dominate opposing operations on land		Fix and destroy opposing land forces in operational depth	Pursue and destroy opposing forces in retreat

Note: SOF = special operations forces.

Figure 2.6—Illustrative Campaign Phases

PERSIAN GULF CAMPAIGN AS A PARADIGM

The Persian Gulf campaign (Desert Shield/Desert Storm) offers a useful paradigm. It featured all major elements of U.S. conventional forces operating within a coalition. In addition, USCINCCENT conducted a full campaign that included a wide range of actual and potential operational objectives.¹

MISSION OF THE COMBATANT COMMANDER IN THE PERSIAN GULF

The mission was to compel Iraqi forces to withdraw from Kuwait and to ensure restoration of the legitimate government.² To fulfill this

¹Although a useful paradigm, the Persian Gulf War took place in circumstances that were exceptionally advantageous to the United States and almost certainly not typical of future conflicts. The anti-Iraq coalition had a single, limited, clearly defined, and easily attainable objective. The almost complete lack of overhead cover facilitated intelligence collection, air attack, and rapid maneuver. Saudi Arabia had a generally excellent infrastructure and provided massive quantities of sustaining supplies. The coalition had ample time to build up its forces for offensive operations and the opportunity to conduct an extensive air phase. Moreover, the Iraqi forces were almost completely ineffective on the operational and tactical levels of war. Iraqi air forces generally refused combat and Iraqi naval forces were helpless against coalition air attack. When the ground offensive began, most Iraqi maneuver forces offered brief resistance before surrendering or attempting to withdraw. A future contingency is unlikely to have so many favorable aspects.

²Anticipating a British request to see the mission statement, USCINCCENT drafted a strategic directive to himself as "Combined Commander," but apparently this directive never received official approval in Washington. The draft text gave the USCINCCENT mission as follows:

mission, the coalition and USCINCCENT first enforced U.N.-imposed economic sanctions, then conducted a theaterwide air offensive, and finally launched a brief, decisive air-land-sea offensive to forcibly evict Iraqi forces.

OPERATIONAL OBJECTIVES IN THE PERSIAN GULF³

During the Persian Gulf campaign, USCINCCENT attained the following operational objectives:

- Counter opposing weapons of mass destruction.
- Deploy combat-ready forces to host countries.
- Establish infrastructure to sustain forward-deployed forces.
- Sustain forward-deployed forces.
- Dominate opposing operations in the air.
- Dominate opposing operations at sea and exploit sea at will.
- Dominate the cognitive environment.
- Enhance capabilities of U.S. friends and allies.
- Establish an effective coalition.
- Force entry into a region.
- Degrade opposing stocks and infrastructure.
- Dominate opposing operations on land and operate at will.

1. TASK: Undertake operations to seek the complete withdrawal of Iraqi forces from Kuwait in accordance with the terms of UN resolutions and sanctions. If necessary and when directed, conduct military operations to destroy Iraqi armed forces, liberate and secure Kuwait to permit the restoration of its legitimate government, and make every reasonable effort to repatriate foreign nationals held against their will in Iraq and Kuwait. Promote the security and stability of the Arabian/Persian Gulf region (Schwarzkopf, 1992, pp. 386–387).

³See Appendix B for a comprehensive list of operational objectives.

Counter Opposing Weapons of Mass Destruction

At the time of the Persian Gulf campaign, Iraq had biological and chemical weapons ready for use and was conducting a crash program to develop a nuclear weapon or device. The United States acting unilaterally and the coalition performed two important tasks:

- Deter use of opposing WMD through credible threat of retaliation.
- Suppress and destroy opposing WMD.

Deter Use of Opposing WMD Through Credible Threat of Retaliation. On 9 January 1991, Secretary of State James A. Baker III warned the Iraqi Ambassador Tariq Aziz that use of unconventional weapons would elicit a devastating response from the United States. Whatever response the United States may have planned or intended, Iraqi leaders construed this warning to mean that the United States would retaliate with nuclear weapons.⁴ Therefore, they believed that the effects of using biological or chemical weapons (and they probably considered these highly uncertain) would be outweighed by U.S. nuclear use.

Suppress and Destroy Opposing WMD. Throughout the Persian Gulf campaign, USCINCENT gave high priority to destruction of Iraqi WMD, but the effort was not completely successful. U.S. aircraft conducted repeated attacks on known nuclear facilities, such as the Tuwaitha research center in Baghdad (struck by Israel in 1981), the Al Jesira production facility northwest of Mosul, and the uranium extraction plant at Al Qaim near the Syrian border. Coalition air forces also attacked all facilities known or suspected to be involved in the production of biological and chemical weapons. But most Iraqi chemical weapons survived because they were stored in nondescript facilities that had no unique signatures.⁵ The bulk of Iraqi nuclear weapon facilities survived because USCINCENT lacked the

⁴Smith, 1995, pp. A1, A19.

⁵United Nations Special Commission teams discovered about 150,000 chemical munitions that were more or less usable and still in storage (Cohen, 1993a, pp. 21–26, 32; DoD, 1992, pp. 206–207). See also Gander, 1992, pp. 413–415; Ripley, 1992, pp. 554–558.

necessary intelligence concerning them. "By the end of the Gulf War, American intelligence had only begun to realize the extent of Iraq's nuclear weapons development beyond Tuwaitha."⁶ Better intelligence on Iraqi WMD in all categories became available after the war when the International Atomic Energy Agency (IAEA) conducted inspections in Iraq. But IAEA encountered persistent Iraqi obstruction, even after Hussein Kamel Hassan Majeed defected and confirmed the extent of Iraqi programs.

Deploy Combat-Ready Forces to Host Countries

This operational objective primarily affects U.S. forces, but during the Korean conflict, the Vietnam War, and the Persian Gulf campaign, allied countries also deployed forces. Deployment (as opposed to forced entry) is administrative, i.e., unopposed by enemy forces, but it may depend critically upon dominating opposing operations in the air and at sea. Tasks performed during the Persian Gulf campaign included the following:

- Deploy air forces.
- Deploy naval forces.
- Deploy special operations forces.
- Deploy light maneuver forces.
- Deploy heavy maneuver forces.
- Mobilize the National Guard and reserve forces.

Deploy Air Forces. In a rapidly developing crisis, a commander may elect to initially deploy combat forces at the expense of support units, as occurred during Desert Shield. Tactical air forces are largely self-deploying and can arrive in the theater within hours to days. For example, F-15 aircraft of the 1st Tactical Air Wing deployed from Virginia to the Gulf nonstop with seven aerial refuelings. By 9 August, two days after the order to deploy, the unit was flying combat air patrols over Saudi Arabia. However, large-scale air deployments can require extensive support. This support can include en-

⁶Cohen, 1993a, p. 225.

route staging bases, in-flight refueling, and arrangements to use regional air bases and airports. Airlift can include military transport aircraft (C-130, C-141, C-5, C-17), assets from the Civil Reserve Air Fleet (CRAF), and chartered commercial aircraft. Military airlift is a well-understood system, but its performance in an actual campaign can vary widely from expectations.⁷

Deploy Naval Forces. Naval forces are not only self-deploying but self-sustaining through the use of fast combat support ships, replenishment oilers, ammunition ships, fleet oilers, and combat stores ships. Under most circumstances, some naval forces are likely to be in or near the region at the outset of a campaign. When Desert Shield began, there were six U.S. surface ships in the Persian Gulf. The USS *Independence* carrier battle group (CVBG) was in the vicinity of Diego Garcia and the USS *Dwight D. Eisenhower* CVBG was in the Eastern Mediterranean. Sealift may include the Ready Reserve Force (RRF), Fast Sealift Ships (FSS), Afloat Prepositioning Ships (APS), and Maritime Prepositioning Ships (MPS). MPS are organized into three squadrons, each supporting one Marine Expeditionary Brigade (MEB).

Deploy Special Operations Forces. Special operations forces include the Ranger Regiment, Special Forces (SF) groups, and Sea-Air-Land (SEAL) teams with various insertion platforms. With the exception of Rangers, all of these forces participated in the Persian Gulf campaign.

Deploy Light Maneuver Forces. Light maneuver forces include airborne infantry, air assault troops, light infantry, and Marines. With

⁷During the Persian Gulf campaign, aircraft utilization rates were a third to a half below planned levels and average payloads were 12 to 40 percent below planning factors. The causes included inadequate operational planning (and hence lack of a stable requirement for airlift), late call-up of reserve crews, inability of units to prepare cargo quickly enough, and maintenance problems with C-5 aircraft. See Lund et al., 1993. According to USCINCENT:

Since we'd been in the middle of revising Central Command's battle plan when the crisis broke, we hadn't yet entered the data into the computer banks—a painstaking process that under normal circumstances takes a full year. Our only alternative was to schedule the airlift and sealift by hand. . . . Officers at Transportation Command told us: "We keep sending airplanes down to Fort Bragg and they keep loading the wrong stuff!" The Airborne commander at Fort Bragg insisted, "I'm sitting here looking at an empty airfield. I've got troops lined up waiting and there isn't a single airplane anywhere!" We were in danger of losing it (Schwarzkopf, 1992, pp. 310-311).

the exception of light infantry, all of these forces participated in the Persian Gulf campaign. A light force, such as the 82nd Airborne Division, can deploy into theater within days. For example, the ready brigade of 82nd Airborne Division began deployment on 7 August and took up defensive positions around the Dhahran airport by 13 August 1990.

Deploy Heavy Maneuver Forces. Heavy (armored and mechanized) maneuver forces of the active Army can deploy within weeks to months, depending upon the times required to position the forces and to sealift their equipment. As an example, the 24th Infantry Division (Mechanized) began deployment on 7 August and occupied defensive positions in the Al-Jubayl area by 23 September.

Mobilize the National Guard and Reserve Forces. Readiness varies widely among services and force elements. At one extreme, some Air National Guard and Air Force Reserve units can be available in hours at training levels little inferior to the active force. At the other extreme, heavy roundout brigades of the Army National Guard did not deploy to the Gulf with their parent divisions, despite the long buildup.⁸

Establish Infrastructure to Sustain Forward-Deployed Forces

During the Persian Gulf campaign, coalition forces had the advantage of modern high-capacity airports and seaports, including facilities constructed with excess capacity to receive allied forces. Tasks performed during the campaign included the following:

- Obtain host nation support.
- Develop airports.
- Develop seaports.

⁸Two heavy brigades were designated as roundout to divisions that took part in Desert Storm: 155th Armored Brigade (1st Cavalry Division), and 48th Infantry Brigade (24th Infantry Division). The 155th Armored was called up and attached to the 4th Infantry Division that did not deploy. The 48th Infantry was called up, trained as a separate brigade, including rotation through the National Training Center, and was still training when the war ended (Rees, 1992, p. 116). RAND finds that the best current estimate for postmobilization preparation is 128 days. National Defense Research Institute, 1992, pp. 119–124.

- Establish lines of communication.

Obtain Host Nation Support. Following the invasion of Kuwait, the United States began to deploy forces and use Saudi facilities before any formal agreements were concluded. Subsequently, USCENTCOM coordinated logistic support through the Saudi Arabian military. Saudi Arabia provided fuel, water, transportation, and facilities for U.S. troops deployed in Saudi Arabia and adjacent waters at no cost. Kuwait and the United Arab Emirates (UAE) contributed cash and in-kind support.⁹

Develop Airports. The primary air bases at Dhahran and Riyadh were fully developed, modern facilities requiring little improvement. The main problem during the campaign was insufficient ramp space to handle the large numbers of arriving aircraft. The problem was alleviated by using other Saudi airports and the bases at Thumrait and Masirah in Oman.

Develop Seaports. Some areas of operations, such as Somalia in Operation Restore Hope, afford few usable facilities. In contrast, Saudi Arabia offered excellent modern facilities at Ad-Damman and Al-Jubayl, the two principal seaports supporting operations. Even so, there was insufficient capacity at almost every location to store the massive influx of supplies and munitions. U.S. engineers constructed temporary storage space at these seaports.

Establish Lines of Communication. Saudi Arabia has excellent all-weather roads in the coastal area, but a far less well developed network inland, where coalition forces operated. To support operations, U.S. engineers and contract personnel built or maintained over 2,000 kilometers of road. The coalition established a series of logistic bases roughly along the Trans-Arabian Pipeline (Tapline) Road paralleling the Trans-Arabian Pipeline and close to the Kuwaiti-Saudi border.

Sustain Forward-Deployed Forces

During the initial stage of Desert Shield, USCINCCENT was anxious to close a window of opportunity for Saddam Hussein to attack Saudi

⁹In addition to host nation support, Japan, Germany, and Korea made cash and in-kind contributions.

Arabia successfully. Therefore, he delayed deployment of support forces so that more combat forces could arrive quickly. He enjoyed access to a well-developed and undamaged infrastructure, but sustainment of a high-intensity war still posed enormous challenges. Operational objectives included the following:

- Provide ammunition and munitions.
- Provide petroleum products, rations, and other expendables.
- Provide theater-level maintenance.

Provide Ammunition and Munitions. A logistician calculates the required stocks based on the forces involved, the anticipated intensity of combat, and the duration of the operation. Then he plans backward to ensure that these stocks will be available. The most important variables include supplies available locally, distances from seaports and airports to the forward supply sites, and the transportation infrastructure of the region. Transportation means to conduct a logistic buildup in theater can include cargo aircraft, trucks, railroads, and inland waterways.

Provide Petroleum Products, Rations, and Other Expendables. Requirements for sustaining supplies depend critically upon the amount and kind of supplies available in the region. For example, during Desert Shield and Desert Storm, three coalition countries (Saudi Arabia, Oman, and the United Arab Emirates) contributed fuel, with the exception of some specialized aviation fuels, to support all air, land, and sea operations.¹⁰ On average, the Saudis supplied more than 20.5 million gallons of fuel each day.¹¹ To distribute this fuel, the coalition laid pipelines, deployed fuel bladders, and employed large numbers of refueling vehicles and tankers.

During Desert Shield, an important objective was to provide sustaining supplies for XVIII Airborne Corps and VII Corps to outflank Iraqi forces. Forward logistic bases were required to support this plan. Sufficient munitions and supplies to sustain 60 days of combat were

¹⁰At the height of Desert Storm, the U.S. Air Force was consuming 15 million gallons of jet fuel per day. The above noted coalition states provided fuels of all kinds with a total value of approximately two billion dollars (Cohen, 1993a, p. 5).

¹¹DoD, 1992, p. 105.

trucked from Al-Jubayl and Dhahran on the Persian Gulf to sites west of Wadi Al-Batin in the interior of Saudi Arabia. This effort was accomplished over a single line of communication, the two lane Tapline road using large numbers of locally obtained trucks.¹²

Provide Theater-Level Maintenance. Depending on the duration of the campaign, much or little theater-level maintenance may have to be accomplished within the theater of operations. During the Persian Gulf campaign, much aviation maintenance above unit level was performed in the continental United States and Europe. Facilities at Rhein Main Air Base in Germany, Morón Air Base in Spain, and Sigonella in Italy were involved.

Dominate Opposing Operations in Air

This operational objective is not uniquely associated with air forces. Naval forces, especially carrier-based aviation, maneuver forces, and special operations forces also contribute. Tasks performed during the Persian Gulf campaign included the following:

- Defeat opposing attacks in friendly air.
- Suppress and destroy opposing ballistic missiles.
- Suppress and destroy opposing cruise missiles.
- Suppress and destroy opposing air defenses.
- Degrade sortie rates of opposing aircraft.

Defeat Opposing Attacks in Friendly Air. Defeat of air attacks on naval forces and land targets are interrelated. These two air defense problems are significantly different, but they can be complementary. During Desert Storm, for example, theater air defense was accomplished over Saudi Arabia by land-based F-15 and F-16 fighters and over the Persian Gulf by carrier-based F-14 flying combat air patrol

¹²According to Schwarzkopf, 1992, p. 391,

Pagonis called it his "gypsy caravan"—the damndest array of vehicles and civilian drivers I'd ever seen. I'd be out on some road and would marvel at the convoys going by: East German trucks, Czech trucks, and Polish trucks, some so old they didn't look as if they'd run. A lot of the drivers were hired men from Pakistan, India, and Bangladesh who had come to Saudi Arabia to find work.

(CAP).¹³ They were controlled over land through the Airborne Warning and Control System (AWACS) and over water through Aegis cruisers. Theater air defense and air defense of maneuver forces are also complementary. The former defends at medium to high altitudes, while the latter defends at low altitude in close proximity to the protected forces. In addition to defense against air-breathing threats, this objective includes defense against ballistic missiles once they are launched.

Successful air defense contributes to suppression of opposing air defense by securing the survival of friendly aircraft and reducing the numbers of opposing aircraft. In addition, it frees multicapable aircraft to fly attack sorties. Air defense also contributes directly to attaining sea control.

Suppress and Destroy Opposing Ballistic Missiles. Suppression of opposing missiles is critically dependent on exploitation of space to provide surveillance and also on suppression of opposing air defense to allow patrols over the areas where missiles are likely to be deployed. During Desert Storm, Defense Support Program (DSP) satellites routinely detected launches of Iraqi Scud missiles. Reconnaissance aircraft, including TR-1 and RF-4C, and Joint Surveillance and Target Attack Radar System (JSTARS) attempted to locate Scud launchers and support vehicles. In addition, British Special Air Service (SAS) teams and U.S. SOF were inserted into the areas of suspected Scud deployment ("Scud boxes").¹⁴ In daylight, A-10 and F-16 aircraft were on patrol. At night, F-16 and F-15E with low-altitude navigation and targeting infrared for night (LANTIRN) and A-6 with forward-looking infrared (FLIR) were on patrol. In

¹³Land-based fighters were controlled by three E-3 Airborne Warning and Control Systems (AWACSs) on orbit along the border between Saudi Arabia and Iraq/Kuwait. Carrier-based fighters were controlled by an Aegis cruiser in the northern Gulf (USS *Bunker Hill* or USS *Worden*). The two control systems had a direct data link. The Iraqi attempted only one air penetration against the coalition. On 24 January, two Iraqi F-1s flew down the border between the AWACS-controlled airspace and the Aegis-controlled airspace. AWACS vectored four Saudi F-15s toward them, and a Saudi pilot destroyed both before they could release ordnance.

¹⁴Sir Peter de la Billière commanded British forces during Desert Storm. According to his account, attack aircraft often took 50 minutes or longer to arrive on target, long enough for the mobile launchers to relocate. Therefore, SAS patrols began to conduct their own attacks with Milan Anti-Tank Guided Missiles (ATGMs). See Billière, 1992, pp. 220–227. See also Schemmer, 1991, p. 36, for a claimed success by U.S. SOF.

addition, B-52s bombed Scud facilities and suspected hiding places. It is uncertain whether any mobile Scud launchers were destroyed, but the attacks may have prevented more launches from occurring.¹⁵ Silkworm anti-ship cruise missiles also proved to be elusive targets, but they failed to penetrate coalition air defenses.

Suppress and Destroy Opposing Cruise Missiles. Cruise missiles can be launched from a wide variety of platforms and pose special difficulties in target acquisition and engagement. During Desert Storm, the Iraqis fired two land-based Silkworm anti-ship cruise missiles toward the USS *Missouri*. One Silkworm landed in the water and the other was destroyed in flight by HMS *Gloucester* using Sea Dart surface-to-air missiles (SAMs). A U.S. EP-3 naval reconnaissance aircraft located the Silkworm launch site, which was destroyed by an A-6E aircraft using Rockeye cluster bombs.

Suppress and Destroy Opposing Air Defenses. A complete air defense system integrates fighters, SAMs, and anti-aircraft artillery. Suppression of air defense can seldom be accomplished as a discrete step or with finality. More often, suppression is a continual task associated with attack missions. During the Vietnam War and Desert Storm, aircraft equipped with electronic countermeasures (ECM) and anti-radiation missiles routinely accompanied attack aircraft. In Vietnam, F-105G Wild Weasel armed with Shrike anti-radiation missiles attacked SAM sites while other specialized aircraft accomplished jamming. In Desert Storm, numerous types of aircraft employed tactical air-launched decoys to deceive the air defense system. A variety of aircraft, including F-4G Wild Weasels armed with HARM, attacked targets associated with Iraqi air defense. During the latter part of Desert Storm, the Iraqis became reluctant to activate

¹⁵According to DoD, 1992, p. 226,

By early February, the counter-Scud effort seemed to be having an effect, although no destruction of mobile launchers had been confirmed.

See also Cohen, 1993a, p. 32, and Cohen, 1993b, p. 14. At night when most Scud launches occurred, attack aircraft could not positively identify the target. Aircraft on patrol visually observed Scud launches 42 times but delivered ordnance against suspected Scud on only eight of these occasions. Even then, they had no assurance that the targets were not support vehicles or decoys. The best decoys were indistinguishable from real launchers to a ground observer in daylight beyond about 25 yards (Cohen, 1993a, p. 29).

their radar for fear of retaliation. Coalition fighters also flew sweep missions and CAP to protect attacking aircraft from Iraqi fighters, should any appear.

During Desert Storm, the coalition successfully suppressed Iraqi theater air defense, allowing coalition aircraft to fly with impunity at medium to high altitudes, beyond the range of air defense artillery and small heat-seeking missiles.¹⁶ This impunity allowed forward air controllers (FACs) in F-16 aircraft to loiter in deep kill boxes for hours without suffering loss. It also allowed FACs in OA-10 and OV-10 aircraft to control close air support (CAS).

Degrade Sortie Rates of Opposing Aircraft. As outlined in the previous chapter, air supremacy can be quantified or expressed in terms of relative advantage. In quantitative terms, perhaps the most significant measure is opposing sortie generation. Although large and relatively modern, the Iraqi Air Force avoided combat by flying only about 30 sorties per day during the first week of Desert Storm. Since the coalition had little difficulty in suppressing Iraqi medium- to high-altitude SAM, the Iraqi Air Force conceded air supremacy by refusing to fly. But Saddam Hussein could still have ordered his Air Force to conduct a large-scale attack, perhaps one designed to have a political effect.¹⁷ To preclude such an attack, the coalition attacked hardened aircraft shelters. When these attacks began,¹⁸ Iraqi aircraft

¹⁶Prior to Desert Storm, U.S. pilots were trained to attack at low altitude in order to underfly missile defenses, such as those that Soviet forces typically deployed. During Desert Storm, coalition forces rapidly suppressed Iraqi medium- to high-altitude missiles with the result that coalition pilots enjoyed a virtual sanctuary above 10,000 feet. They exploited this sanctuary by attacking at medium altitude (DoD, 1992, p. 167).

¹⁷The coalition staff saw several options. Saddam Hussein might attack Israel, as he did with Scud, in the hope of widening the war. He might attack the seaports of Dhahran and Al-Jubayl to prevent the flow of supplies to coalition forces. He might attack a carrier battle group in the hope of sinking or damaging major combatants. He might attempt an all-out attack on maneuver forces using chemical weapons. Even a suicidal attack could have had severe political effect by causing dissension in the coalition or by turning public opinion against the war. See DoD, 1992, pp. 168–169.

¹⁸The coalition began attacking hardened shelters on 23 January, seven days after offensive air operations began. The attacks were carried out by F-117, F-111, Tornado, and Buccaneer aircraft, the most effective being F-111s with case-hardened laser-guided bombs. On 26 January, the Iraqis began large-scale flights of combat aircraft to Iran. The coalition detected these flights and began flying CAP along the Iran-Iraq border.

began to fly to neutral Iran, where they were interned and played no further role in the war.

Dominate Opposing Operations at Sea and Exploit Sea at Will

Sea control is usually gained by a combination of naval forces and land-based aviation. Tasks performed during the Persian Gulf campaign included the following:

- Destroy and suppress opposing surface combatants.
- Lay mines and neutralize opposing mines at sea.
- Secure sea-lanes for friendly use.
- Interdict and control maritime traffic.

Destroy and Suppress Opposing Surface Combatants. Destruction and suppression of surface combatants can involve anti-ship cruise missiles (ASCM), sea mines, attack submarines, surface combatants, helicopters, and fixed-wing aircraft. Helicopters are more usually employed against submarines, but they can also attack surface combatants. During Desert Storm, British Lynx helicopters destroyed Iraqi craft using Sea Skua missiles. This objective contributes to anti-submarine warfare (ASW) by removing a dimension of the threat and freeing friendly surface combatants to concentrate on ASW. It contributes to neutralization of the opposing mine threat by eliminating surface combatants as mine layers. It also contributes to securing the use of sea-lanes and seaports by eliminating surface threats to convoys and port facilities.

Lay Mines and Neutralize Opposing Mines at Sea. Ideally, an opposing mine threat is neutralized by suppressing the potential mine layers, including submarines, surface ships, and aircraft. Once minefields are in place, mine clearing operations can involve specially equipped ships, helicopters, and special operations forces, such as SEAL teams. During Desert Shield, coalition naval forces were not allowed to operate in the northern tip of the Persian Gulf opposite Kuwait. As a result, the Iraqis sowed minefields without being detected, and during Desert Storm, two U.S. combatant ships were

damaged by sea mines.¹⁹ Coalition A-6 aircraft dropped sea mines northwest of Bubiyan Island to prevent Iraqi fast patrol boats from leaving their bases.

Secure Sea-Lanes for Friendly Use. Dominance over opposing operations in the air and at sea contributes to security of sea-lanes. During the Persian Gulf campaign, the coalition enjoyed unchallenged use of sea-lanes to the states of the Gulf Cooperation Council (GCC), including the Suez Canal.

Interdict and Control Maritime Traffic. Interdiction and control of maritime traffic may enforce a blockade, an embargo, or sanctions imposed by the Security Council. During the Gulf campaign, the coalition enforced sanctions intended to compel Iraq to withdraw its forces from Kuwait. Coalition surface combatants patrolled the Red Sea, the Gulf of Oman, and the southern Persian Gulf, intercepting over 6,300 ships. Eleven interceptions required warning shots, but disabling fire was not used. Take-downs were accomplished by SEAL teams and Marines who sometimes rappelled ("fast roped") onto the deck of the intercepted ship.

Dominate the Cognitive Environment²⁰

As originally framed, a primary task of the project was to identify the key C³I variables. It quickly became apparent that C³I is an inadequate description of one side in a complex two-sided struggle to dominate the cognitive environment.²¹ The ultimate objective of

¹⁹The coalition assumed that the Iraqi minefields would be located near the littoral where they could be covered by Silkworm missiles, but the Iraqi had actually sown a wide arc of mines far into the Gulf. Mine countermeasure ships passed through these minefields without incident and began sweeping closer to shore. The USS *Tripoli* and USS *Princeton* entered the unsuspected minefields and were severely damaged. Iraqi minefields influenced the decision not to conduct a major amphibious assault (DoD, 1992, pp. 276–286, 299).

²⁰During the research phase of this study, this operational objective was originally called "C³I." The formulation became "achieve information dominance," then "achieve cognitive dominance," and finally "dominate the cognitive environment." Comparable formulations may be found in the literature, e.g., "The 'sunrise systems' in the new era will be those that help military organizations establish and exploit *information dominance*" (emphasis added; Krepinevich, 1994, p. 25).

²¹This operational objective is partially contained in policy for command and control warfare:

cognitive dominance is to make decisions that are more timely than the opponent's and to exploit the situation more skillfully than the opponent does.²² Commanders through the ages have tried to dominate the cognitive environment, often in very imaginative ways. Under conditions of modern war, cognitive dominance opens immense possibilities, yet it is fraught with great uncertainty.

Cognitive dominance can be an immense advantage for forces with sophisticated capabilities. Microelectronics have opened astonishing new ways to attain dominance. As never before, a commander can know exact locations of friendly forces, their condition, and their contact with opposing forces in near-real time. He can detect opposing forces with unprecedented accuracy even in darkness and even when the opponent has assiduously tried to conceal his forces. He can fuse information and intelligence rapidly and display it graphically in the fighting compartment of an armored vehicle, the cockpit of an aircraft, or the command center of a ship, as well as operations centers at each echelon. If he can also deny his opponent such capabilities, he has an immense advantage.

Success in dominating the cognitive environment may be highly uncertain during the course of a campaign. Unless a commander has gained access to enemy communications, such as Ultra provided during World War II, he cannot be certain how much the enemy knows. Damage assessment, particularly as concerns opposing communications facilities and command entities, will probably be fragmentary and subject to widely varying interpretations. A commander cannot be certain how much degradation has been achieved, considering built-in redundancy, work arounds, and replacement.

Command and Control Warfare. The integrated use of operations security (OPSEC), military deception, psychological operations (PSYOP), electronic warfare (EW) and physical destruction, mutually supported by intelligence, to deny information to, influence, degrade or destroy adversary C² capabilities, while protecting friendly C² capabilities against such actions (CJCS, 1993).

²²The observation-orientation-decision-action (OODA) loop attributed to John Boyd emphasizes the positive aspect of cognitive dominance. "Getting inside the loop" implies acting before the enemy can react to a changing situation. There is also a negative aspect of cognitive dominance: degrading the enemy's cognitive processes by destroying his associated capabilities and deceiving him.

In force-on-force combat, comparable weapon systems are often in direct competition. By contrast, cognitive dominance involves widely disparate means and large asymmetries. For example, the means to collect data on opposing assets are primarily sensor-platform combinations dedicated to this purpose, but the means to disrupt and distort an opponent's collection can include virtually every element of friendly forces plus a variety of nonmilitary means such as control over public media. In addition, there are likely to be very large asymmetries between the opposing sides. For example, during Desert Storm, coalition forces enjoyed an immense advantage in sophisticated airborne collectors such as the AWACS and the JSTARS. Tasks performed during the Persian Gulf campaign included the following:

- Collect information on friendly forces.
- Acquire intelligence on opposing forces.
- Develop friendly situational awareness.
- Disrupt and distort opponent's information and intelligence.
- Reduce will of opponent to fight.

Collect Information on Friendly Forces. Unlike intelligence, information is offered willingly and will usually be available to the commander if it can be communicated. Military commands routinely compile extensive information on friendly assets, especially the readiness of combat forces and stocks available to support operations. Breakdown of information, as occurred with Iraqi maneuver forces during Desert Storm, may be both symptom and cause of a more general disintegration.

Acquire Intelligence on Opposing Forces. Intelligence is data from multiple sensors and sources fused and presented in usable formats. The first step in fusion may involve correlating data from area searches to detect and identify objects of interest.²³ The final step

²³For example, War Breaker, an umbrella program under the Defense Advanced Research Projects Agency (DARPA), will fuse data from such different sources as electronic messages, satellite imagery, radar returns, and emplaced sensors. This fusion will employ advanced algorithms, fuzzy logic, and neural networks to detect

requires human analysts to interpret intelligence on the basis of expert knowledge.

Acquiring intelligence involves a variety of platforms including satellites, manned aircraft and unmanned aerial vehicles (UAV), surface ships, submarines, a variety of ground-based systems, emplaced sensors, reconnaissance conducted by SOF, and human agents in enemy-held territory. The appropriate mix of platforms and associated sensors varies according to the situation and the salient operational objectives. During combat, intelligence is heavily derived from reports received from friendly forces in contact. Indeed, for forces without sophisticated collection assets, combat reporting may be the dominant source of intelligence. Intelligence can be broadly evaluated against three criteria:

- *Timeliness.* Information and intelligence have ephemeral value during combat. In general terms, air operations require minute-to-minute timeliness, while ground operations require hour-to-hour timeliness of collection. However, some aspects of air operations, such as air tasking orders, are not so time sensitive.
- *Accuracy.* At the operational level, awareness of the situation can be based on coarse-grained information and intelligence. But at tactical level, intelligence must be fine-grained to serve as targeting data.²⁴
- *Coverage.* Dominance over operations in the air and at sea generates the preconditions for adequate coverage. Demands for coverage are widely divergent and highly time sensitive. No military organization has sufficient resources to collect and process intelligence indiscriminately. At any given time, some portions of the opposing array are likely to be unimportant, while other portions are crucial to the conduct of operations.

and identify elusive targets such as mobile missile launchers. See Scott, 1993a, pp. 37–38, and Scott, 1993b, pp. 151–153.

²⁴Distinction between operational- and tactical-level intelligence is often blurred because of the requirements for close air support and deep fire. See Stewart, 1991. Tactical-level intelligence, especially overhead photography, was considered inadequate during Desert Storm (DoD, 1992, pp. 332–333). See also interview with Rear Admiral Edward Shaefer, Jr., reported in *Defense Week*, 24 May 1993.

Develop Friendly Situational Awareness. An estimate of the situation based on information and intelligence is the foundation for situational awareness that informs decisionmaking. The actual process of decisionmaking is highly complex and not easily understood. In sophisticated forces, it involves automated decision support systems. In all forces, it depends on the training and experience of commanders and staffs and on their interactions at various levels of command.

Disrupt and Distort Opponent's Information and Intelligence. Disruption involves a wide range of actions by friendly forces to destroy combinations of sensors and platforms or to suppress their operations. Disruption of enemy command and control may involve direct attacks on command entities and deception that blinds or misleads an opponent. Attacks typically involve manned aircraft, cruise missiles, ballistic missiles such as the Army Tactical Missile System (ATACMS), and special operations forces. During Desert Storm, the coalition attacked command facilities associated with the highest Iraqi military and political leadership, including Saddam Hussein, but had only limited success.²⁵

Communications targets during Desert Storm included microwave relay towers, telephone exchanges, and landlines. Landlines were destroyed directly by SOF and by dropping bridges that supported communications cables. Some 1,500 strikes were delivered against telecommunications, but it is difficult to measure their effectiveness.²⁶ The opposing command entities were incompletely identified and damage assessment was subject to wide uncertainty. The

²⁵These attacks were inhibited by a desire to avoid civilian casualties. Cable News Network (CNN) reported the loss of civilian life caused by attacking the Al Firdos bunker on 13 February. Subsequent to this attack, USCINCCENT personally reviewed targets in downtown Baghdad and attacks on leadership targets diminished. Aided to some extent by this reticence, Saddam Hussein and his regime survived the war intact, although presumably some degree of disruption occurred. The degree of disruption "cannot be quantified, not even roughly" (Cohen, 1993a, p. 15).

²⁶See Cohen, 1993b, p. 13.

Communications with the outside world were severely hampered and communications within Iraq were difficult, but not impossible. Through the end of the war, Saddam [Hussein] could communicate with forces in Kuwait's theater of operations [sic], but the volume and reliability of these communications, and of those between the theater and Baghdad, declined markedly.

effect of attacking opposing command entities is highly sensitive to the operational context. In static defense, Iraqi forces required only minimal command and control, but the requirements would have been much greater had they attempted to conduct a mobile defense or to counterattack.

Distortion invokes passive countermeasures, such as camouflage, communications discipline, and stealth technology, as well as deception operations, such as those that accompany operational-level maneuvers, particularly amphibious or airborne assault. Prior to Desert Storm, for example, USCINCCENT concealed preparations for a flanking attack while deceiving the Iraqi leaders into believing that the coalition would attack directly into Kuwait. At the same time, he watched intently for signs that the Iraqis had begun to realize the danger on their right flank.²⁷

Reduce Will of Opponent to Fight. Psychological warfare is especially effective when it reinforces recent experience. During the Persian Gulf campaign, U.S. 8th Special Operations Squadron dropped eleven 15,000-lb BLU-82 "Daisy Cutter" bombs on Iraqi defensive positions. These devastating blasts were usually followed by leaflets, telling the Iraqis that there would be more such explosions and advising them to defect.²⁸ The same unit also dropped 17 million propaganda leaflets, including passes for safe conduct through coalition lines. Many surrendering Iraqis had these safe conduct passes in their hands.

Effects on Other Campaign Objectives

In important, but often poorly understood ways, cognitive dominance affects the accomplishment of other operational objectives. As a commander gains dominance over operations in the air and at sea, this contributes to cognitive dominance by denying intelligence to the enemy and improving friendly intelligence collection. At the

²⁷To General Schwarzkopf's dismay, CNN and *Newsweek* magazine gave strong indications during early February that XVIII Airborne Corps and VII Corps were west of Wadi al-Batin. Fortunately, the Iraqi failed to respond (Schwarzkopf, 1992, pp. 439–440).

²⁸Benjamin F. Schemmer, "8th Special Ops Squadron Nicknamed Bomb Squadron After BLU-82 Missions," *Armed Forces Journal International*, July 1991, p. 37.

same time, cognitive dominance makes a fundamental contribution to attaining these same objectives. Cognitive dominance is often critically important to amphibious assault. During Desert Storm, SEAL teams simulated an amphibious assault, and coalition naval forces conducted feints to deceive the Iraqis concerning the actual objective of the amphibious task force and ultimately to deceive them into believing an assault was imminent.

Cognitive dominance can make a vital contribution to dominance over opposing operations on land. During Desert Storm, USCINCENT delayed deployment of XVIII Airborne Corps and VII Corps into their start positions west of Wadi Al-Batin until the last possible moment. In addition, coalition forces conducted deception operations that included false radio traffic, dummy positions, feints and raids by 1st Cavalry Division and 1st Marine Expeditionary Force (MEF), ostentatious preparations for amphibious assault, and “berm busting.”²⁹ USCINCENT enjoyed excellent intelligence on Iraqi maneuver forces, allowing him to know if they redeployed to protect their western flank.³⁰ In addition to this intelligence advantage, coalition forces were controlled flexibly and responsively, while the Iraqi forces were controlled through a rigid hierarchy that rapidly lost control.

Simplified Approach to Evaluation

An attempt to capture the complexity of cognitive processes, even excluding the process of decisionmaking, would exceed the bounds of this study and defeat the purpose of simple theater-level analysis. A simplified approach should be based on comparison of friendly

²⁹An 8–10 foot dirt berm identified the border between Iraq and Saudi Arabia. 1st Cavalry Division cut gaps in the berm to portray an imminent attack just west of Wadi Al-Batin (Kinsvatter, 1992, p. 20). See DoD, 1992, p. 344.

³⁰From Schwarzkopf, 1992, p. 408,

As soon as I woke up each morning, I'd study the enemy situation map next to my desk—hoping against hope that there had been no shifting of Iraq's forces to the west. . . . Saddam and his generals seemed oblivious of their exposed flank. I knew that if they didn't shift west now [prior to the air offensive], our air force would make sure they never did—for them to try to maneuver forces under our bombing would give us an easy target.

and opposing information and intelligence in the operational context of an unfolding campaign.

At the conclusion of Desert Storm, the coalition dominated the cognitive environment. Figure 3.1 illustrates this dominance in regard to timeliness, accuracy, and coverage of information and intelligence. The boxes enclose "ground truth" and the round areas enclose forces covered by information (friendly forces) and intelligence (enemy forces), indicating *inter alia* that the coalition knew more about Iraqi forces in Kuwait than Iraqi commanders did.

As a result of the Global Positioning System (GPS),³¹ efficient communications, and a workable command structure, the coalition was accurately informed nearly in real time of the location and status of its forces, including tactical units operating in the desert, such as maneuver battalions and SAS teams.³² Intelligence was timely and accurate regarding Iraqi air forces because of overhead coverage of air bases, AWACS in orbit, and Aegis coverage. For example, AWACS detected the escape of Iraqi aircraft to Iran, prompting coalition aircraft to mount CAP on the Iran-Iraq border. Maritime patrol aircraft provided intelligence on Iraqi surface combatants that led to their destruction. Satellite coverage, manned reconnaissance flights, un-

³¹GPS is one of the services provided by NAVSTAR satellites. A GPS receiver needs signals from four satellites to determine its precise position in three dimensions. The receiver measures the time of arrival of these signals to compute latitude, longitude, and altitude. In March 1990, the Department of Defense activated "selective availability" (SA) to degrade the accuracy of data for commercial users. With SA, positioning became accurate to 100 meters, adequate for navigation but not for military targeting. However, at the time of Desert Storm, most coalition forces, including U.S. maneuver forces, had not received military receivers. Accordingly, SA was deactivated and some 4,490 commercial receivers were sent to the Gulf. These commercial receivers produced spherical accuracies to about 25 meters with 95 percent certainty. Coalition forces used GPS to provide launch coordinates for ships firing Tomahawk land attack missiles (TLAM), to guide aircraft to targets, to register artillery, to precisely locate minefields, to determine the positions of maneuver forces, and to support special operations. To the extent that the Iraqis had commercial receivers, they enjoyed access to similar data (DoD, 1992, pp. T-226 to T-228; Hewish and Turb , 1991, pp. 75-84).

³²See Billi re, 1992, p. 226.

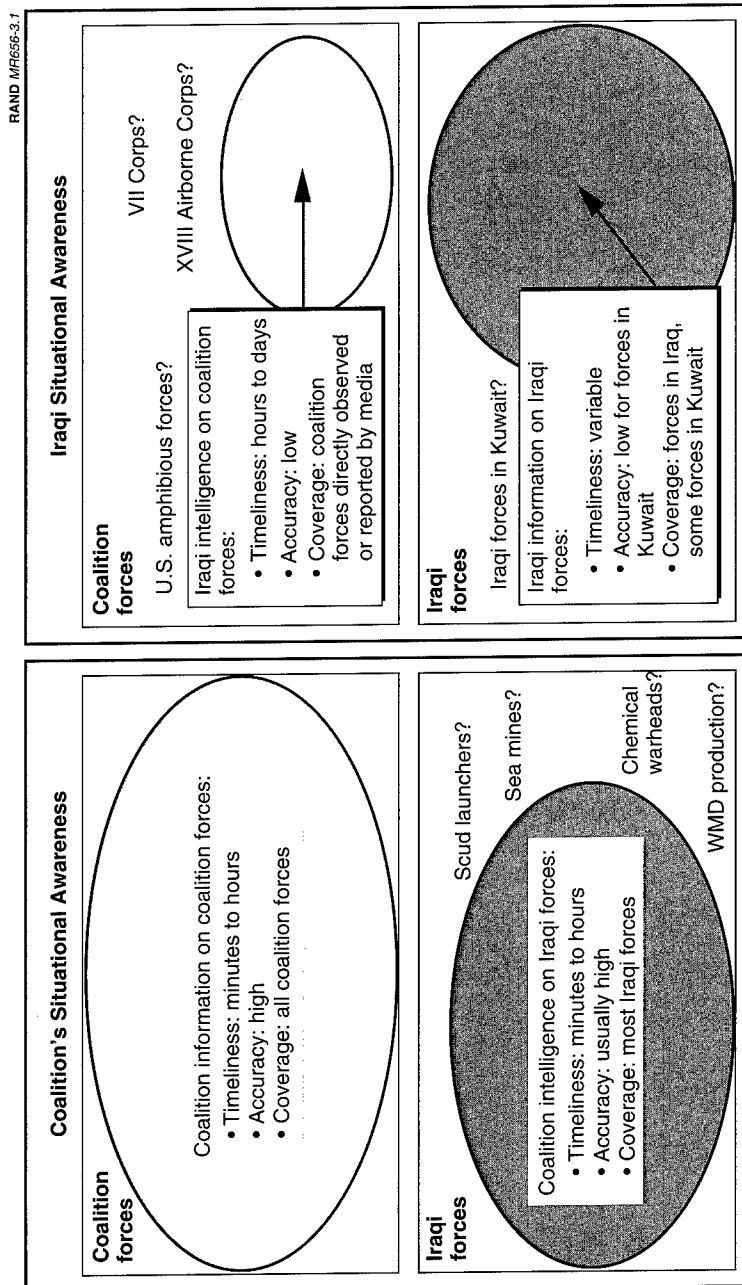


Figure 3.1—Cognitive Dominance in Desert Storm

manned reconnaissance vehicles, JSTARS, and ground-based radar provided intelligence on Iraqi maneuver forces. JSTARS gave USCINCENT the unprecedented advantage of a nearly real-time overview of ground operations in theater depth.³³

The coalition also experienced some failures to collect information and intelligence. For example, 24 hours before the cease-fire talks were to begin, USCINCENT discovered there were no coalition forces at Safwan, although his situation map showed clearly that 1st Infantry Division (Mechanized) occupied the area.³⁴ The coalition could not locate Scud launchers until they fired and DSP satellites, aircraft on patrol, or SOF detected these launches. After firing, the Iraqis were usually able to relocate the launchers before coalition forces could attack them. The coalition lacked intelligence on sea mines because its naval forces had not operated in the northern Persian Gulf prior to Desert Storm. It lacked intelligence on Iraqi WMD, especially facilities associated with programs to develop nuclear weapons and field storage of chemical warheads.

Iraqi commanders lost track of their forces during Desert Storm. When the Iraqi commanders met with coalition commanders at Safwan to negotiate a truce, they were largely ignorant of the situation. They knew less about the status of their own forces, especially surrenders,³⁵ than the coalition knew. They were astonished to learn

³³Two JSTARS aircraft deployed to Saudi Arabia and flew missions on 49 consecutive nights during Desert Storm. JSTARS was linked to AWACS and EC-135 Rivet Joint missions through the Joint Tactical Information Distribution System (JTIDS). Ground station modules were located at Riyadh and at U.S. corps headquarters. JSTARS covered areas approximately 160 by 180 km. It identified and tracked thousands of targets, even distinguishing tracked from wheeled vehicles. Through JSTARS, USCINCENT saw the movements of Iraqi maneuver forces and supply columns in nearly real-time, as though the campaign were a mapboard exercise. JSTARS detected the advance of Iraqi forces toward Al-Khafji during the air phase and the retreats that began during the ground phase. In addition, controllers aboard JSTARS vectored F-15Es directly to targets (DoD, 1992, pp. T-84 to T-86).

³⁴USCINCENT discovered Safwan was not occupied when he selected it for the cease-fire talks that followed the unilateral announcement of a cease-fire. He was upset because he had ordered that the area be occupied to block Iraqi escape. To secure Safwan, U.S. 1st Infantry Division moved large forces into the area and ordered the local Iraqi commander to leave (Schwarzkopf, 1992, pp. 472, 475–477).

³⁵U.S. General Schwarzkopf, USCINCENT, spoke with Iraqi Lt. Gen. Sultan Hashim Ahmad, Deputy Chief of Staff, Iraqi Ministry of Defense, at Safwan:

how deeply coalition maneuver forces had penetrated into Iraq.³⁶ Of course, this dominance was not due exclusively to coalition efforts. It also reflected a breakdown in Iraqi morale. Iraqis of all ranks were wearied by the long war against Iran and convinced even before the air phase of Desert Storm that Iraqi forces were hopelessly inferior to the coalition's forces. As a result, the ground phase quickly produced mass surrenders. Understandably, the higher commanders were not well informed of this disintegration.

Enhance Capabilities of U.S. Friends and Allies

Most U.S. campaigns in this century have been conducted through coalitions. In a future campaign, the United States is likely to have important allies and may rely on them to make vital contributions. During the Persian Gulf campaign, tasks included the following:

- Provide weapons and equipment.
- Train friendly and allied forces.

Provide Weapons and Equipment. Most of the Islamic countries that participated in the coalition against Saddam Hussein had received U.S. equipment and supplies through foreign military sales (FMS) programs before the crisis began. During the campaign, the United States supplied these countries with critical items to prepare their forces for offensive operations.

Train Friendly and Allied Forces. In many instances, the United States will help to equip and train allied forces before a contingency arises. But for a variety of reasons, including political and fiscal con-

[Ahmad speaking] "And we would like to have the numbers of the POWs on our side as well."

"As of last night, sixty thousand," I [Schwarzkopf] replied. "Or sixty thousand plus, because it is difficult to count them completely." His face went completely pale: he had had no concept of the magnitude of their defeat (Schwarzkopf, 1992, p. 489).

³⁶For example, on 2 March, two days after the cease-fire, two battalions of Republican Guards attempted to move west and opened fire on scouts from the 24th Infantry Division (Mechanized), not suspecting that the entire division was deployed in their path. The division commander conducted a counterattack that destroyed the Iraqi column (Schwarzkopf, 1992, p. 478).

straints, much may need to be done during the course of a campaign. During Desert Shield, U.S. Army SF helped to train the Royal Saudi Land Forces in subjects such as fire support coordination and close air support. As other allied forces arrived, SF formed over 100 coordination and training teams to instruct them in U.S. practice, especially as concerned fire support. Similarly, the U.S. Naval Special Warfare Task Group equipped and trained the crews of three ships in a reconstituted Kuwaiti Navy.

Establish an Effective Coalition

Tasks performed during the Persian Gulf campaign included the following:

- Negotiate combined command and control arrangements.
- Establish C³I entities.

Negotiate Combined Command and Control Arrangements. Appropriate control arrangements are prerequisite to a common defense. They may take the form of a close alliance with combined command and staff, such as characterized the Anglo-American alliance during World War II and the North Atlantic Treaty Organization (NATO). Or they may take the form of a looser coalition, such as characterized the Persian Gulf War. These arrangements may reflect political sensitivities as well as actual responsibility for operations. The agreement allowing entry of U.S. forces into Saudi Arabia during Desert Shield placed them under the "strategic direction" of the Saudi Military Command, a dictum that was never defined.³⁷ During Desert Shield, USCINCENT commanded U.S. forces and had operational control of British forces. The Saudi Commander of Joint Forces commanded Islamic forces in the theater. USCINCENT and the Saudi Commander were responsible to their respective national command authorities, and they coordinated through a combined center.

³⁷DoD, 1992, p. 493.

Establish C³I Entities. USCINCCENT controlled virtually all non-Islamic forces³⁸ in theater, while Saudi Arabia controlled forces from Islamic countries. Absent a combined staff, a Coalition Coordination, Communication, and Integration Center (C³IC) kept both partners informed of each other's activities and provided a formal link between the headquarters. C³IC was collocated with USCENTCOM headquarters and the Saudi high command.

Force Entry into a Region

The United States is the foremost practitioner of forced entry in world history as exemplified by the Pacific campaigns against Japan; the invasions of Sicily, Italy, and France; and the Inchon landing. Forced entry may involve landing beaches, airdrop zones, heliborne landing zones, or any combination of these. Dominance over opposing operations in the air and at sea are usually prerequisite. During Desert Shield, coalition forces were invited into the region by Gulf Arab states, but subsequently prepared to force entry on the Gulf littoral behind the Iraqi defensive lines. Tasks performed during the last phase of the Persian Gulf Campaign included the following:

- Conduct opposed amphibious landing.
- Conduct opposed heliborne assault.

Conduct Opposed Amphibious Landing. For several reasons, USCINCCENT decided not to conduct a planned amphibious assault at Ash Shuaybah south of Kuwait City: Iraqi sea mines posed a significant threat; urbanized terrain behind the beaches offered excellent defensive positions; and the ground offensive proceeded so swiftly as to obviate the need for amphibious assault. Instead, USCINCCENT ordered feints and deception operations to make the Iraqi leadership believe that a large-scale amphibious assault was imminent. As events transpired, the Iraqi leaders kept large forces on the Gulf littoral, while Marine forces attacked overland into Kuwait

³⁸Initially, French forces were controlled through national channels and coordinated with Saudi forces, but during December French forces came under USCENTCOM control, reflecting French participation on the left flank of the planned offensive.

City.³⁹ But lack of operational mobility and an inflexible command system may have predisposed the Iraqis to remain immobile, whether or not they feared an amphibious assault.

Conduct Opposed Heliborne Assault. With 6th French Light Armored Division and one brigade of U.S. 82nd Airborne Division on its left flank, U.S. 101st Airborne Division (Air Assault) conducted history's largest heliborne assault against weak and scattered Iraqi resistance. By the end of the first day of the ground offensive, designated G-Day, elements of 101st Airborne Division were astride the major highway linking Baghdad and Kuwait.

Degrade Opposing Stocks and Infrastructure

During Desert Storm, the coalition conducted an intense effort to degrade Iraq's stocks and infrastructure, employing manned aircraft, cruise missiles, and SOF. An ad hoc planning group, known colloquially as the "Black Hole,"⁴⁰ developed a strategy and target sets for the air offensive.⁴¹ Despite almost perfect dominance over Iraqi airspace, the coalition had widely varying degrees of success in degrading stocks and infrastructure. Important tasks included the following:

³⁹According to Myatt, 1991, p. 76,

When you get down and you look at the really fine engineering effort that was done on defense of the beaches and at least six of the eleven Iraqi divisions that were facing 1 MEF [Marine Expeditionary Force], I would say that probably 40 percent to 50 percent of the Iraqi artillery pieces were pointed to the east in defense of this perceived real threat—an attack from the Gulf.

Myatt commanded 1st Marine Division during the attack into Kuwait. For reasons why the assault was not conducted see Dwyer, 1992, pp. 95–98; Trainor, 1992, pp. 30–34; DoD, 1992, pp. 295–304.

⁴⁰This planning group was composed of personnel drawn from Checkmate, Central Command Air Forces (CENTAF), and other coalition staffs. It was initially called the Special Planning Group and later became the Guidance Apportionment and Targeting Division. It reported to Brig. Gen. Buster C. Glosson, who directed production of the Air Tasking Order (Cohen, 1993a, pp. 9–12; Cohen, 1993c).

⁴¹The "Black Hole" developed 12 Iraqi target sets: leadership facilities, electrical generation, communications, integrated air defense, air forces and airfields, weapons of mass destruction, Scud production and storage, naval forces and ports, oil refineries, railways and bridges, Iraqi military units, and military production and storage (DoD, 1992, pp. 126–130; Coyne, 1992, pp. 40–46).

- Disrupt opposing communications.
- Disrupt opposing power generation.
- Disrupt opposing transportation.
- Degrade opposing stocks of war-related products.

Disrupt Opposing Communications. A major aim during Desert Storm was to severely degrade or sever communications between Baghdad and Iraqi forces in Kuwait. Associated targets included switching centers, coaxial landlines running parallel to the Tigris and Euphrates Rivers, microwave relays, and fiberoptic lines along the oil pipeline from Basra into Kuwait. The coalition attacked leadership and communications targets from the very beginning of the air offensive using Tomahawks and F-117s with laser-guided bombs. Despite having precise intelligence obtained from Western firms that had constructed Iraq's communication system, USCENTCOM failed to sever Iraqi communications. Without access to Iraqi sources, it is impossible to estimate how far communications were degraded or what the effect may have been on Iraqi command and control.

Disrupt Opposing Power Generation. Attaining this objective diminishes industrial production and transportation, thus reducing a country's overall capability to wage war. The coalition destroyed or damaged over 80 percent of the Iraqi capability to generate electrical power, causing a collapse of the power grid. Iraqi military forces shifted to emergency generators that presumably produced less-reliable power.⁴²

Disrupt Opposing Transportation. Destroying and disrupting transportation can contribute to disruption of military-related production facilities by preventing the delivery of raw materials and finished components to factories. Transportation targets include airports, airfields, seaports, railroad facilities such as marshaling yards, roads, bridges, and tunnels. Depending upon the duration of the campaign, the aim of these attacks may be to deny reinforcement or more generally to disrupt an opponent's economy, especially military production. Widening destruction of the German transportation system, primarily the railways, was a key effect of the allied strategic

⁴²Cohen, 1993a, p. 17–19, 32–33; DoD, 1992, p. 200.

bombing campaign during 1944–1945. During Desert Storm, coalition air forces targeted bridges over the Tigris and Euphrates Rivers. Using precision-guided munitions, the coalition destroyed 41 permanently constructed bridges and 31 pontoon bridges. As a result, Iraq was largely unable to supply its forces in the KTO.

Degrade Opposing Stocks of War-Related Products. Some stocks, such as munitions, are related solely to war. Other stocks, such as petroleum products, are just as vital to the civilian economy. During World War II, allied air forces attacked Axis petroleum facilities including the costly and celebrated attacks on oil fields in Romania. During Desert Storm, coalition air forces attacked Iraqi oil facilities in an effort to interrupt oil refining and to destroy finished product. Despite these attacks, Iraq had sufficient stocks to supply its forces but was ultimately unable to deliver them.

Dominate Opposing Operations on Land and Operate at Will

On 22 February 1991, President Bush announced that unless Iraq withdrew its forces from Kuwait, the coalition would initiate ground operations.⁴³ In a decision that seemed incomprehensible to Westerners, Saddam Hussein refused the ultimatum, although he must have realized that the coalition had overwhelming force. Subsumed tasks included the following:

- Repel opposing attacks on land.
- Maneuver friendly forces into advantageous position.
- Fix and destroy opposing land forces in operational depth.
- Destroy opposing land forces in contact with friendly forces.
- Evict opposing forces and secure key terrain.

⁴³From Schwarzkopf, 1992, p. 445,

The National Security Council was about to meet, and [General Colin] Powell and I hammered out a recommendation. We suggested that the United States offer a ceasefire of one week: enough time for Saddam to withdraw his soldiers, but not his supplies or the bulk of his equipment, most of which was dug in or disabled. . . . At bottom, neither Powell nor I wanted a ground war.

See also Powell, 1995, p. 517.

Repel Opposing Attacks on Land. Saddam Hussein did not attempt an invasion of Saudi Arabia while it was still vulnerable, but during the air phase of Desert Storm, he ordered elements of two divisions to attack toward Al-Khafji and Al-Wafrah.⁴⁴ Coalition air forces halted these attacks, and Islamic ground forces defeated the surviving Iraqi forces. Since World War II, it has been well understood that heavy forces cannot operate successfully when the opponent has air superiority. Recent technological advances, especially radar surveillance of ground operations, precision-guided munitions, and terminally guided submunitions, make it difficult for heavy forces even to survive in this circumstance.

Maneuver Friendly Forces into Advantageous Position. Maneuver allows a commander to force combat at the times and places of his choosing and to exploit favorable results. Through maneuver, qualitatively superior forces have achieved dramatic victories. Examples include German forces in 1940 (French campaign) and the summer of 1941 (Barbarossa), Israeli forces in 1967 (Six Day War) and 1973 (Yom Kippur War), and coalition forces during Desert Storm.

Since World War II, it has been axiomatic that defense has a tactical advantage, but attack has an operational advantage. The attacker's operational advantage lies in having the initiative. Initiative implies that the attacker can choose when and where battles will occur within a concept of operations that favors his forces. Accordingly, an operational-level commander who believes he has a chance for success will normally attempt offensive operations. U.S. Army Air-Land doctrine emphasizes the importance of seizing the initiative, but it does not imply that an early ground offensive is imperative. It can be more advantageous for U.S. forces to destroy opposing forces out of contact with air attack and deep fires, before beginning ground operations. In this case, the initial maneuver may be simply to fix the

⁴⁴The Iraqi armored and mechanized forces had ineffective artillery support and no air support. The coalition attacked with aircraft including A-6, A-10, F/A-18, F-15E, LANTIRN-equipped F-16, and B-52 directed by JSTARS and TR-1. Saudi Arabian and Qatari armored forces completed the Iraqi defeat. USCINCCENT was puzzled by these attacks and concluded that they were a propaganda ploy. See Schwarzkopf, 1992, pp. 424–427. However, it is entirely possible that the Iraqis were trying to force an early start to the ground war. Whatever the Iraqis intended to accomplish, these attacks proved that unsupported armor was helpless against the coalition's balanced forces.

opposing forces as was done during the air offensive phase of Desert Storm.

A campaign can develop in a deliberate or hurried fashion. Desert Shield began with hurried deployments of combat forces in an effort to deter Iraq from attacking Saudi Arabia. But by November 1990, USCINCENT believed that coalition forces could defend successfully and began to prepare his forces for an offensive. With Iraqi forces almost completely passive, coalition forces took about three months to prepare for the air phase and four months to prepare for ground operations. By contrast, a campaign in Korea would probably begin with an attack by the DPRK under minimal warning. CINCCFC might have days or even hours to prepare his forces for defense.

Maneuver can be performed on foot, truck-mounted, in armored vehicles, by boat or ship, and by aircraft in any combination. It is usually performed as a joint operation. Prior to close combat, a commander maneuvers his forces to place them in positions of relative advantage for initial battles and for subsequent operations. During this period, maneuver can include feints and deception, massing friendly forces, and flanking movements. Prior to Desert Storm, U.S. VII Corps performed an immense flanking movement, allowing it to attack through a lightly screened area and to envelop the large Iraqi forces positioned in Kuwait.

Maneuver continues during close combat. Commanders of qualitatively superior forces may exploit their superiority by maneuvering more quickly than an opponent can respond. During this period, maneuver can include breakthrough, flanking and turning movements, envelopment, and pursuit. During Desert Storm, coalition forces had to break through Iraqi field fortifications along the Iraq/Kuwait/Saudi border. These breaching operations required extensive rehearsal, heavy fire preparation, and specialized engineer equipment.⁴⁵ U.S. 3rd Armored Division conducted a turning

⁴⁵Lead elements of U.S. 1st Armored Division used Armored Combat Earthmovers (ACE) protected by Bradleys to clear minefields and fill in trenches west of Wadi Al-Batin (Fontenoy, 1992, pp. 33–36). U.S. 1st Marine Division faced more formidable obstacles in Kuwait. Here the Iraqi positions included two belts of barbed wire, minefields, anti-tank ditches, oil-filled fire trenches, and field fortifications. The Iraqis planned to trap coalition forces between these two belts. 1st Marine Division

movement when it advanced from the west and compelled the Iraqi Tawakalna Division to accept combat on a north-south line. VII Corps had almost completed a single envelopment of Iraqi forces when the United States unilaterally halted offensive operations.

Fix and Destroy Opposing Land Forces in Operational Depth. This analysis assumes the definitions shown graphically in Figure 3.2 below. By these definitions, forces are assumed to be in contact when they are within range of indirect fire delivered by short-range rockets, tube artillery, and mortars. The distinction between forces in contact and forces beyond contact is important because an opponent in contact can cause destruction to friendly forces with indirect fire weapons that are normally deployed with his maneuver forces. Prior to the ground offensive during Desert Storm, Iraqi frontline divisions were in contact with coalition forces, but Iraqi forces in mobile reserve, including the Republican Guards divisions, were out of contact. An opponent beyond contact cannot cause destruction with the direct and indirect fire weapons organic to his maneuver forces, but he may have other means. Destruction and disruption of forces out of contact begins beyond the range of indirect fire and extends to the depth of the maneuver commander's interest.

Attaining this objective influences maneuver in several ways. Initially, a commander may selectively destroy forces out of contact, such as mobile reserves, that could affect his plan of maneuver. During the course of operations, a commander may destroy and disrupt opposing forces that are moving to contact. The means for destroying forces out of contact are diverse and are increasing for technologically advanced countries like the United States. They include long-range bombers, tactical aircraft, cruise missiles, ballistic missiles such as ATACMS, and SOF. Air-delivered munitions include unguided general-purpose bombs, cluster bombs, and guided weapons.

Throughout the air phase of Desert Storm, USCINCCENT exploited air supremacy and superior deep fire systems to destroy and disrupt Iraqi maneuver forces beyond contact. The Air Tasking Order (ATO)

infiltrated two infantry regiments 18–20 kilometers into Kuwait before the ground offensive began. It used tanks equipped with mine plows and amphibious assault vehicles with line charges to breach the minefields (Myatt, 1991, pp. 72–74).

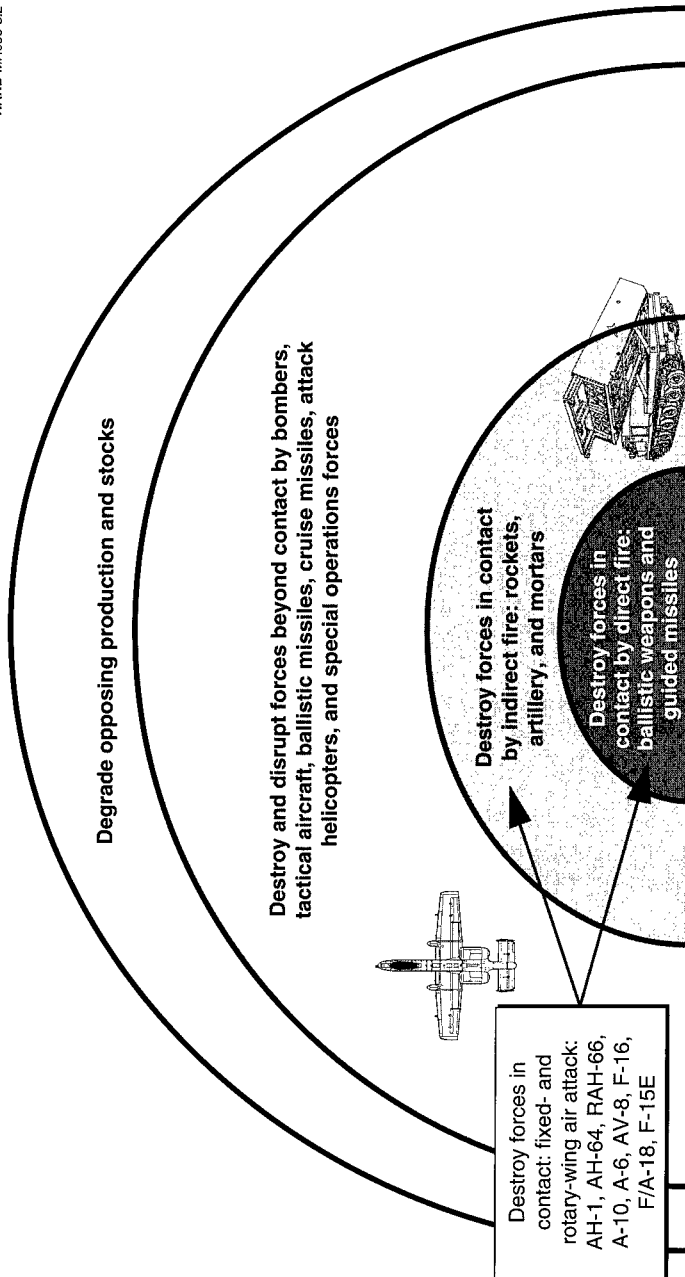


Figure 3.2—Schematic View of Fires

directed attack aircraft to kill boxes 30 miles square. Within these kill boxes, they attacked targets of opportunity, but more often they were directed by fast FACs who assessed targets and directed attack aircraft to the most lucrative.⁴⁶ Coalition aircraft employed general-purpose bombs, cluster bombs, and various guided bombs. A-10 aircraft flew throughout the KTO firing some 5,000 television and imaging infrared Mavericks against Iraqi maneuver forces. F-111, F-15E, and A-6E aircraft employed laser-guided bombs against revetted armored vehicles, a technique described by the pilots as “tank plinking.”

A rough cut on expected outcomes can be obtained by using the most effective weapons as benchmarks. The Sensor Fused Weapon (SFW) will greatly increase the effectiveness of air attack against armored vehicles. For air-delivered munitions, outcomes might be calibrated to the expected kill per F-15E sortie using SFW.⁴⁷ For deep fire weapons, they might be calibrated to expected kill per salvo of ATACMS firing Brilliant Anti-armor Submunition (BAT).⁴⁸

Destroy Opposing Land Forces in Contact with Friendly Forces. The means to destroy forces in contact include fixed- and rotary-wing air attack, indirect fire, and direct fire by maneuver forces.

⁴⁶Attack pilots became frustrated when they failed to find targets or delivered ordnance on empty revetments. To solve these problems, 388th Fighter Wing flew Fast FAC missions with F-16 aircraft. Fast FAC coordinated with AWACS and EC-130 Airborne Battlefield Command and Control Center (ABCCC). They normally flew between 15,000 and 30,000 feet, descending only to pinpoint targets. When the Republican Guards began to dig their equipment into the sand, fast FACs used binoculars to help them identify targets. Fast FACs had the important operational effect of making daylight movement too risky for Iraqi forces (Welsh, 1993, pp. 66–70).

⁴⁷In a single sortie, one F-15E carrying 12 tactical missile dispensers of SFW might be expected to kill 12 vehicles in a medium-density target, such as an armored division in attack formation. It might be expected to kill 24 vehicles in a high-density target, such as an armored division on a road march. Kill rates of this magnitude will give air attack an unprecedented ability to halt enemy armored attacks. In addition to F-15E, F-16C, F/A-18s, B-1 and B-2 aircraft might be equipped with SFW. See Bowie et al., 1993, pp. 51–59, 69. However, this lethality cannot be understood in isolation. It is the output of an operational concept that includes surveillance, assessment, mission preparation, control of forces, and execution. In the example cited, the ability of an F-15E to deliver ordnance on a valid target depends critically on surveillance and control of forces.

⁴⁸BAT is an unpowered air vehicle weighing about 20 kg. It is self-guided by acoustic and infrared sensors to attack armored vehicles using a tandem shaped charge. One ATACMS missile could deliver 13 BATs.

Cognitive dominance is becoming increasingly important in this context. For example, the M-1A2 Abrams main battle tank is provided with an Inter-Vehicular Information System (IVIS) that allows data to be shared with other armored vehicles, aircraft, and indirect fire support teams.⁴⁹ Connectivity of this sort should ultimately allow commanders to employ the optimal mix of close air support, indirect fire, and direct fire at any time in the battle. It should also help to alleviate long-standing problems in controlling attack aircraft that were illustrated by friendly fire incidents during Desert Storm.

Indirect fire includes rockets, artillery, and mortars that normally require forward observation to be fully effective. In most wars fought with large conventional forces during the 20th century, indirect fire has been the predominant killer of maneuver forces, even though indirect weapons have been relatively ineffective against troops protected by armor and field fortifications. Indirect fire contributes to the effectiveness of direct fire in several ways. It depletes the opposing forces and limits their reaction to attack. It also combines with direct fire in a synergistic fashion. In a sophisticated army, elements of the maneuver force routinely call for indirect fire during engagement and coordinate this fire with other actions.

Introduction of terminally guided projectiles in all three categories of indirect fire weapons is greatly increasing their effectiveness against armor. For example, the U.S. Army is currently developing a Sense and Destroy Armor Submunition (SADARM) for delivery by the Multiple-Launch Rocket System (MLRS) or 155-mm artillery. These submunitions will detect armored vehicles using millimeter-wave and infrared sensors, then engage by firing explosively formed penetrators. It is expected to be effective against self-propelled artillery offering a relatively static target, although not against armor on the move.

Cognitive dominance is playing an increasingly important role in the control of indirect fires. For example, U.S. Army and Marine forces use the AN/TPQ-36 pulse Doppler radar to detect incoming artillery rounds. Coupled computers can locate the opposing artillery and

⁴⁹The U.S. Army achieved this connectivity by alterations to IVIS software demonstrated at Fort Knox during March 1993 (Goodman, 1993).

calculate a fire solution in real time, i.e., while the incoming rounds are still on the way.

The Iraqis deployed large numbers of rocket and artillery systems during Desert Storm, but they caused little damage to coalition forces for several reasons. The coalition made a concerted effort to destroy Iraqi artillery prior to the ground offensive using attack aircraft, MLRS, and artillery. Also, during the course of operations, coalition artillery and aircraft delivered rapid and precise counter-battery fire.⁵⁰ In addition, the surviving Iraqi artillery was poorly employed. The Iraqi artillerymen appear to have fired at preplanned targets without forward observation.

Direct fire delivered by maneuver forces includes ballistic weapons and short-range guided missiles. Ballistic weapons range from main tank guns to crew-served and individual weapons. During Desert Storm, U.S. tank commanders consistently engaged Iraqi tanks and infantry fighting vehicles outside their engagement ranges.⁵¹ Thermal sights, computerized fire control, and superior crew training combined to make the M1A1 overwhelmingly superior. In numerous successful engagements with Iraqi armor, U.S. forces suffered no permanent losses of M1A1 tanks.⁵²

Ground-launched anti-tank guided missiles played a relatively small role in Desert Storm because desert terrain favored the use of main battle tanks that were lethal at extreme ranges and less vulnerable than missile-carrying vehicles. However, air-launched Maverick and Hellfire missiles were used extensively. The U.S. Army is currently

⁵⁰See Myatt, 1991, p. 72:

Between 0600 and 1400 on that first day [of the ground offensive], we had 42 instances of incoming artillery that we handled this way. The TPQ-36 picked up the source grid, and we were able to use our artillery, or the 2d [Marine] Division's artillery—the 10th Marines—to attack 24 of the 42 targets. The remainder were attacked by Marine AV-8B aircraft within a few minutes of the artillery fire being detected.

⁵¹The median detection range was 2,600 meters (DoD, 1992, p. T-44). Unofficial accounts indicate detections at 3,500 meters and successful engagement beyond 3,000 meters.

⁵²Only 18 incidents of combat damage were reported. Of these, 9 were permanent losses, all caused by friendly fire. The other 9 were repairable and most of this damage was caused by mines (DoD, 1992, p. T-145).

developing a kinetic energy rocket⁵³ that promises greater effectiveness than shaped-charge weapons.

Evict Opposing Forces and Secure Key Terrain. At the conclusion of Desert Storm, the Iraqis acknowledged defeat by withdrawing their forces from Kuwait under terms negotiated with the coalition at Safwan.

PHASES IN THE PERSIAN GULF CAMPAIGN

The framework developed in this study supports analysis of phases in the Persian Gulf Campaign. This campaign was accomplished in four phases⁵⁴ with decision points marking transitions between phases. The following were phases and decision points:

- *Delay Phase.* In the event of an Iraqi attack, USCINCCENT planned to conduct delaying operations while securing major seaports and airfields in the Eastern Province. At the same time, coalition forces initiated a naval blockade intended to compel Iraqi forces to withdraw from Kuwait. Decision points were USCINCCENT's judgment that coalition forces could conduct a forward defense and President Bush's subsequent decision to develop an offensive capability.
- *Defense and Buildup Phase.* In the event of an Iraqi attack, USCINCCENT planned to conduct a forward defense. At the same time, the coalition built up forces to conduct offensive operations while continuing the blockade. Decision points were

⁵³Line-of-sight anti-tank (LOSAT) program.

⁵⁴This analysis concerns the campaign as it actually occurred, not as planned. According to USCENTCOM planning, Desert Storm was to be accomplished in four phases: (1) strategic air campaign, (2) air supremacy in the Kuwaiti theater of operations, (3) battlefield preparation, and (4) offensive ground campaign. The actual campaign diverged from this planning. USCINCCENT accomplished the first two phases simultaneously, and there was extensive overlap between these phases and the third phase. For example, AV-8 and A-10 aircraft began attacking Iraqi maneuver forces on D-Day, thus contributing to "battlefield preparation." In addition, the "strategic air campaign" continued after 7 February, when emphasis shifted to attacking Iraqi maneuver forces. According to current U.S. Army doctrine, there were four phases: (1) deterrence and defense, (2) subsequent deployment of forces for counteroffensive, (3) air operation, and (4) land operations. See U.S. Army, 1993, p. 3-2.

USCINCCENT's judgment that the coalition was prepared to conduct offensive operations and President Bush's decision to begin the air offensive.

- *Air Offensive Phase.* The coalition conducted offensive air operations throughout Iraq and Kuwait intended to compel Iraqi forces to withdraw from Kuwait. The air operations were also designed to degrade Iraqi maneuver forces in the KTO in preparation for a ground offensive. At the same time, the coalition conducted a large-scale flanking maneuver. Decision points were USCINCCENT's judgment that the combat power of Iraqi maneuver forces in the KTO had been sufficiently degraded and President Bush's decision to begin the ground offensive.
- *Ground Offensive Phase.* The coalition conducted a ground offensive, supported by air attacks and the threat of an amphibious assault, to expel Iraqi forces from Kuwait and to destroy the Republican Guards. Coalition forces conducted a wide flanking attack and attempted to envelop Iraqi maneuver forces in the KTO. The decision point was a unilateral cease-fire declared by the United States with the concurrence of USCINCCENT, who believed that he had accomplished his mission.

Delay Phase

USCINCCENT's concept of operations during this phase was initially to conduct delaying actions while securing major airports and sea-ports. A subsequent concept of operations included defense of the Saudi oil fields. At the same time, coalition naval forces enforced a blockade intended to compel the Iraqis to withdraw from Kuwait. The phase began on 2 August when Iraqi forces invaded Kuwait and ended on approximately 21 October 1990.⁵⁵ In early November,

⁵⁵On 22 October, the U.S. 1st Cavalry Division (Mechanized) completed its deployment into Saudi Arabia. This division was arrayed behind 101st Airborne Division (Air Assault) and 24th Infantry Division (Mechanized) in the final defensive plan for Desert Shield. Using other criteria, this phase might be construed as ending earlier:

By early October, CINCCENT was satisfied the "window of vulnerability" had narrowed and that he could conduct a successful defense of Saudi Arabia. The deployment of forces essential for the defensive mission, however, had taken nearly two months (DoD, 1992, p. 51).

President Bush decided to build up forces for offensive operations. Figure 3.3 summarizes actions to accomplish operational objectives during this phase.

From USCINCCENT perspective, cognitive dominance implied giving an exaggerated appearance of coalition strength. He was particularly anxious to give a misleading impression that coalition forces could conduct a forward defense that would stop an invasion near the Kuwaiti-Saudi border. To create this impression, the coalition prevented Iraqi collection against friendly forces while openly announcing arrivals of U.S. forces. This objective also implied a strong air defense effort to prevent Iraqi overflight. At the same time, coalition air forces were tasked to prepare operations to attain aerospace superiority throughout Kuwait and southern Iraq in the event of an Iraqi attack. This superiority would permit extensive air attacks on Iraqi maneuver forces along their vulnerable lines of communication.

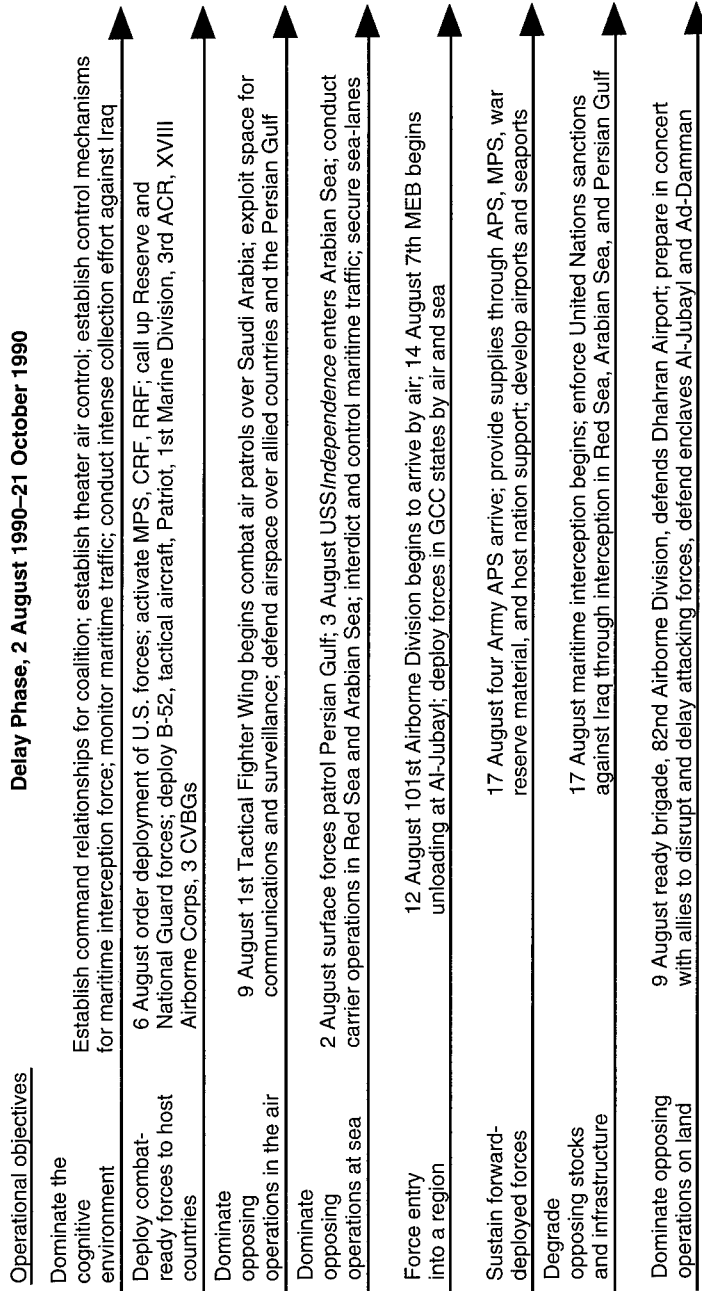
Maneuver forces prepared to delay Iraqi advance and to defend Saudi airports and seaports that would support arrival of reinforcements. After early September, the coalition concept of operations included an amphibious assault on the seaward flank of Iraqi ground forces advancing into Saudi Arabia. Sea control was required to mount this threat and to safeguard the sea lines of communication into the region. In addition, the coalition exploited sea control over regional waters, exclusive of the northern Gulf, to conduct a successful blockade of Iraq. This blockade served the political-military purpose of applying pressure on Saddam Hussein to withdraw his forces

From Schwarzkopf, 1992, p. 348,

But by mid-September—coincidentally, just as the Iraqis shifted into defensive formations—I was able to tell Colin Powell, “We don’t have to worry about the attack anymore. No way they’re gonna seize the oil fields.”

However, the concept of operations in mid-September involved drawing enemy columns into the Saudi desert and subjecting them to air attack until they ran into U.S. defensive positions about 125 miles south of Kuwait. This concept represents an intermediate step between an enclave defense and a forward defense that could prevent substantial incursion by Iraqi forces.

RAND MR656-3.3

Delay Phase, 2 August 1990–21 October 1990**Figure 3.3—Delay Phase**

from Kuwait and might eventually have affected the Iraqi capability to support its deployed forces.

Defense and Buildup Phase

USCINCENT's concept of operations during this phase was to conduct a robust forward defense of Saudi territory while continuing to enforce the blockade. At the same time, he built up forces to conduct offensive operations, in the event Saddam Hussein refused to withdraw his forces from Kuwait. The phase began on approximately 22 October and ended on 16 January 1991 when President Bush directed the air offensive to begin. Figure 3.4 summarizes actions to accomplish operational objectives during this phase.

Cognitive dominance implied denying Iraqi collection against coalition forces, especially those that would execute the main effort during the ground offensive. It also implied a deceptive pattern of air activity intended to gain surprise at the outset of an air offensive. At the same time, the coalition collected a wide variety of data to support air and land offensives, including hydrographic reconnaissance to support amphibious assault. Employing sophisticated sensors and platforms, the coalition acquired excellent intelligence on most Iraqi capabilities. The coalition deployed additional forces to conduct offensive operations including an entire U.S. armored corps (VII Corps) and began to establish forward logistic bases to support these operations. Preparations to dominate operations in the air and at sea acquired wider dimensions. Aerospace supremacy would be required throughout Iraq to support an air phase intended to degrade Iraq's overall capability to wage war. Sea control would be required in the northern Persian Gulf to support an amphibious assault. In preparation to gain this sea control and to support the air offensive, three CVBG entered the Persian Gulf during January.

As additional coalition forces arrived, Iraq lost its opportunity to conduct a damaging attack into Saudi Arabia. In the coalition's final defensive plan, Saudi, Egyptian, and Syrian maneuver forces screened the border of Saudi Arabia with a French brigade on the western flank. U.S. maneuver forces deployed in the depth of the Eastern Province (XVIII Airborne Corps and 1st Cavalry Division) would conduct a mobile defense against the attacking forces. 1st

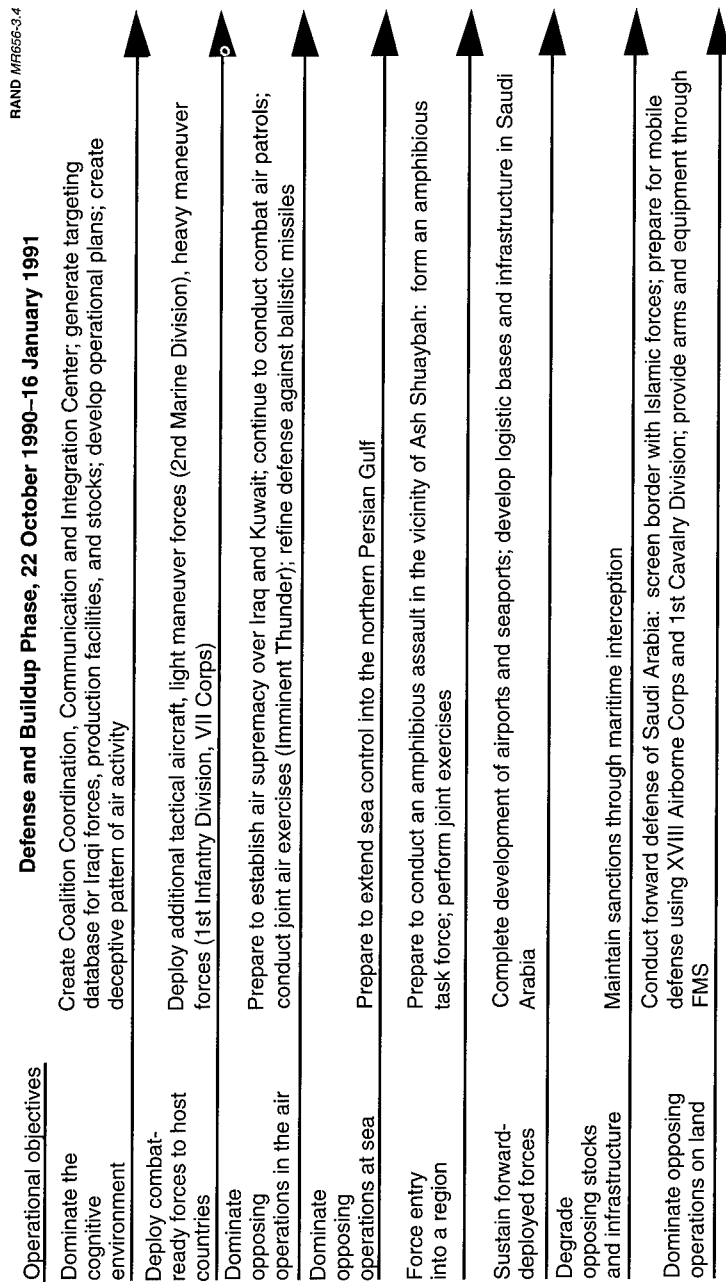


Figure 3.4—Defense and Buildup Phase

Marine Division would defend on the littoral well forward of the Al-Jubayl and Ad-Damman port complexes. USCINCCENT was confident that the coalition could stop any attempt by Iraq to invade Saudi Arabia. Planning for amphibious assault focused on the Ash Shuaybah area southeast of Kuwait City using a task force formed around two Marine Expeditionary Brigades.

Air Offensive Phase

USCINCCENT's concept of operations centered on an air offensive throughout Iraq and the KTO. The air offensive was intended to compel Iraqi forces to withdraw from Kuwait and to prepare for a ground offensive if they remained. Attacks on infrastructure degraded Iraq's ability to move and support its forces. Attacks on Iraqi forces throughout the KTO weakened them in preparation for a ground offensive. At the same time, coalition forces conducted a large-scale maneuver to outflank Iraqi forces defending in Kuwait. The phase began on 17 January and ended on 23 February 1991. Figure 3.5 summarizes actions to accomplish operational objectives during this phase.

USCINCCENT sought to dominate the cognitive environment at the outset of the air phase by masking H-Hour with deceptive air activity and by conducting a special operation to open a corridor through Iraqi radar coverage. Throughout the air phase, coalition forces conducted a variety of activities to cause the Iraqis to expect that the major effort would be through Kuwait supported by an amphibious assault. At the same time, coalition forces maneuvered west of Kuwait. USCINCCENT delayed this maneuver until the last possible moment to prevent the Iraqi leadership from recognizing its dangerous position. Having prevented collection through other sources, USCINCCENT believed that media reports had become Iraq's best source of intelligence. Therefore, he ordered his officers not to make any comment on capabilities or operations.⁵⁶

Dominance over the cognitive environment required collection against a variety of targets including fixed installations, aircraft, naval craft, mobile ballistic and cruise missile launchers, and maneuver

⁵⁶Schwarzkopf, 1992, p. 381.

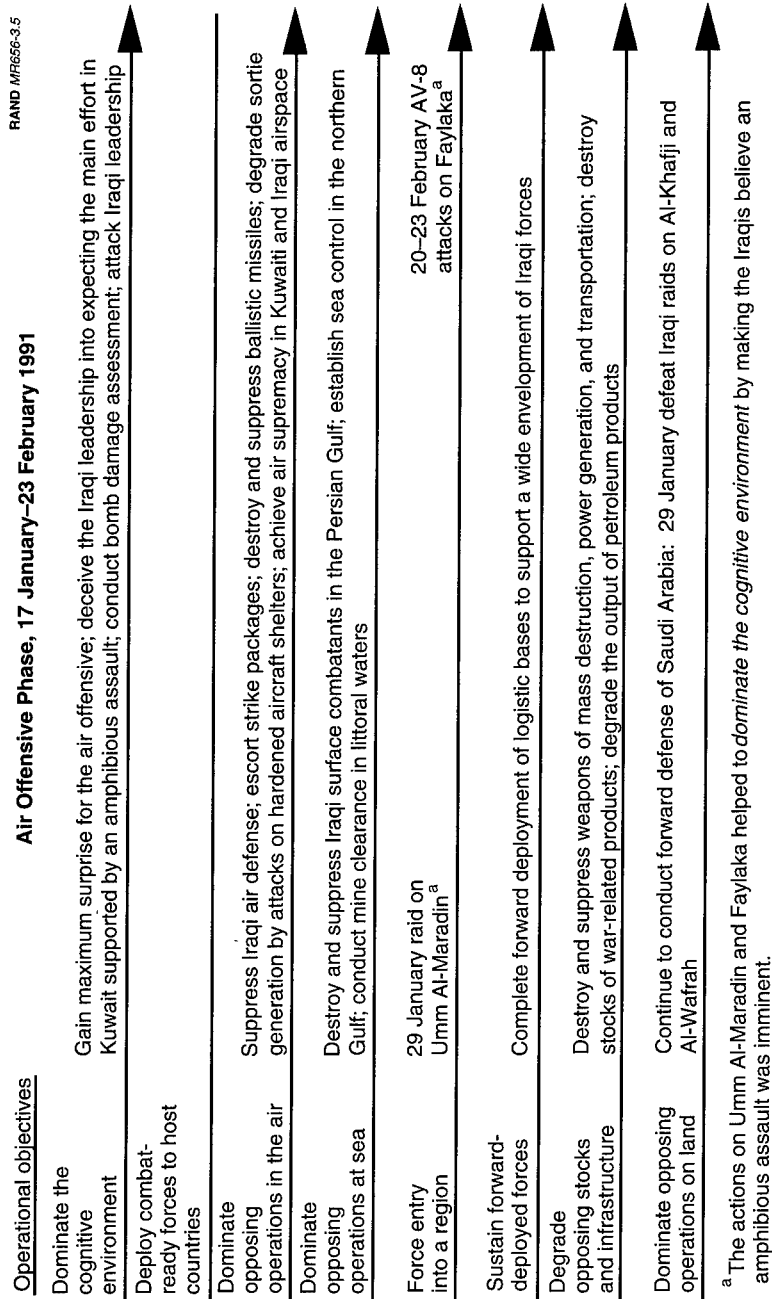


Figure 3.5—Air Offensive Phase

forces in the KTO. AWACS gave real-time data on opposing aircraft in flight, while satellites and reconnaissance aircraft gave an accurate picture of unsheltered aircraft and on the locations of aircraft shelters. There was, however, no way to know which shelters held aircraft. Despite strenuous efforts involving satellites, JSTARS, reconnaissance aircraft, combat air patrol, and SOF inserted by helicopter, the coalition obtained insufficient real-time data to destroy mobile missile launchers but did suppress them to some degree. Bomb damage assessment overstressed the available intelligence assets and produced contentious results, especially as concerned Iraqi maneuver forces. However, USCINCCENT had accurate intelligence on the locations of Iraqi maneuver forces and therefore knew that his deception was succeeding.

The air offensive had two basic objectives: (1) degrade Iraqi stocks and infrastructure by attacking targets throughout the country, and (2) contribute to defeat of Iraqi forces by destroying forces in and out of contact, with priority to those in contact. Both of these objectives contributed to the overall political-military objective of compelling the Iraqis to withdraw from Kuwait. If USCINCCENT had feared an Iraqi ground offensive, he would have begun the air offensive with greater emphasis on destruction of Iraqi ground forces. However, by January 1991, USCINCCENT was convinced that an Iraqi ground offensive would be disastrous for Iraq and the battle of Al-Khafji on 29–31 January confirmed this judgment. Therefore, the air offensive began with very deep targets then shifted to destruction of Iraqi ground forces.

At the onset of the air phase, the coalition dominated opposing air operations throughout the KTO. The Iraqis had little effective air defense and no defense at all against cruise missiles and F-117 aircraft. Coalition attack and ECM aircraft quickly suppressed Iraqi surface-to-air missile defenses at medium to high altitude. Iraqi air forces ceded air superiority by avoiding combat. As the air phase continued, USCINCCENT became concerned that the Iraqis were reserving their remaining aircraft for a massive attack that could saturate coalition air defense. To prevent such an eventuality, he ordered attacks on hardened shelters. The Iraqi response was to seek sanctuary in neutral Iran. Convinced that Iraq was no longer able to conduct a successful air attack, USCINCCENT announced aerospace supremacy on 27 January, 10 days after the air phase had begun.

There were several exceptions to this supremacy. First, Iraqi air defenses remained effective at low altitude employing cannon and small heat-seeking missiles. Second, Iraq retained the capability to fire ballistic (modified Scud) and cruise (Silkworm) missiles from mobile launchers. Patriot was moderately successful in intercepting Scud, but some warheads and missile parts caused damage in Israel and Saudi Arabia. A Silkworm launch against the USS *Missouri* was defeated by Sea Dart missiles.

The coalition exploited dominance in the air by trying to degrade Iraqi stocks and infrastructure. Power generation was severely degraded, but Iraqi military forces continued to operate using emergency power sources. Transportation, especially across the Euphrates River bridges, was severely disrupted, contributing to resupply problems in the KTO. After the war, United Nations inspections revealed that coalition attacks on Iraqi weapons of mass destruction had been ineffective because of insufficient targeting intelligence. The Iraqi nuclear program was generally intact and large stocks of chemical munitions survived. It is unclear to what extent this effort to degrade national capability contributed to the defeat of Iraqi ground forces during the ground offensive. At the same time, the coalition tried to achieve complete cognitive dominance by disrupting the highest levels of Iranian leadership and the national communications system. The effects of these attacks are highly uncertain. Saddam Hussein and his Baath Party retained their control of Iraq, but communications with forces in the KTO may have been disrupted.

Dominance in the air contributed to dominance at sea in the northern Gulf. Under attack by carrier-based aircraft, much of the Iraqi Navy attempted to flee to neutral ports in Iran. Coalition air forces, including carrier-based aircraft diverted from CAP and rotary-wing aircraft, damaged most of these vessels. In addition, coalition aircraft attacked Iraqi naval bases and port facilities. Considering that the Iraqi Navy had become ineffective, the naval component commander declared that he had controlled the northern Gulf as of 8 February. However, the northern Gulf still contained Iraqi sea mines sown while coalition forces were prohibited from operating in these waters. Coalition planners thought the Iraqis had probably sown mines near the Kuwaiti coast where they could be covered by shore-based fires, but the mines were actually in a wide arc out at sea.

Mine countermeasures ships began sweeping near the shore while other ships took up station within these unsuspected minefields. As a result, two U.S. ships activated sea mines and were seriously damaged. Toward the end of the air phase, coalition aircraft heightened the impression of imminent amphibious assault by attacks on Faylaka Island off Kuwait City.⁵⁷

After 7 February, the emphasis of air attacks shifted to destruction of Iraqi ground forces in the KTO. The air component commander allocated the preponderance of effort to attacks against Iraqi maneuver forces in contact with coalition forces to ensure the success of breakthrough operations. In addition, coalition maneuver forces delivered fires on these same Iraqi forces with MLRS, cannon artillery, and attack helicopters. Emphasis was on destruction of Iraqi artillery that posed the greatest danger to coalition forces during breakthrough. The air component commander allocated a lesser effort against Iraqi ground forces out of contact, particularly the Republican Guards north of Kuwait. In addition, coalition naval forces exploited dominance at sea by attacking Iraqi maneuver forces with gunfire, including 16-inch and 5-inch guns. USCINCCENT had set the arbitrary goal of reducing Iraqi effectiveness by 50 percent during the air phase. Because of inadequate bomb damage assessment, estimates of physical destruction were contentious, and in any case USCINCCENT preferred to use a subjective assessment that took other factors into account. Postwar assessments indicate that Iraqi forces in contact may have lost 50 percent of their effectiveness during the air phase, but the Republican Guards in deep reserve were much less severely affected.

Also during the air phase, USCINCCENT maneuvered two U.S. corps west of Wadi Al-Batin to gain an advantage over Iraqi maneuver forces defending in Kuwait. This maneuver, supported by the establishment of immense forward logistic bases, was accomplished in approximately three weeks under great secrecy. At the same time, the 1st Marine Expeditionary Force shifted westward to take advantage of weakness in the Iraqi barriers and field fortifications. Once these maneuvers were accomplished, USCINCCENT was prepared to

⁵⁷The naval component commander wanted to precede the ground offensive with an amphibious assault on Faylaka Island, but USCINCCENT thought this assault might be too costly (Schwarzkopf, 1992, p. 437).

begin the ground phase whenever the weather became sufficiently clear for the coalition to exploit aerospace supremacy. Under heavy pressure to begin the ground phase as quickly as possible, USCINCCENT finally set G-Day for 24 February. He feared that coalition forces could suffer as many as 5,000 casualties during the first two days of combat if they were struck by chemical attacks while trying to breach the Iraqi defensive positions.⁵⁸

Ground Offensive Phase

USCINCCENT's concept of operations was to conduct an extremely rapid, violent ground offensive to defeat Iraqi forces in the KTO and destroy the Republican Guards. The main effort was a wide flanking maneuver by U.S. VII Corps. XVIII Airborne Corps covered the left flank by advancing to the Euphrates River. The secondary effort was an attack directly north to Kuwait City by the 1st Marine Expeditionary Force. The 4th Marine Expeditionary Brigade remained at sea to conduct feints and pin Iraqi forces on the Gulf littoral. The phase began on 24 February and ended on 28 February 1991 with a unilateral cease-fire. Figure 3.6 summarizes actions to accomplish operational objectives during this phase.

Dominance over the cognitive environment during this phase implied control of all coalition forces, especially the maneuver forces, during a high-speed offensive. It also required intensive collection against Iraqi maneuver forces. In particular, JSTARS gave USCINCCENT an unprecedented overview of Iraqi maneuver forces throughout the KTO in near-real time. During this phase, the coalition achieved almost complete cognitive dominance over its opponent. With few exceptions, USCINCCENT and his component commanders had excellent control of their own forces and knew almost everything they needed to know about the Iraqis. By contrast, the Iraqi leaders were surprised by the coalition's main effort and quickly lost control of their own forces. The Iraqi commanders at the Safwan conference apparently knew less about their maneuver forces in the KTO than USCINCCENT did.

⁵⁸Schwarzkopf, 1992, pp. 439, 442.

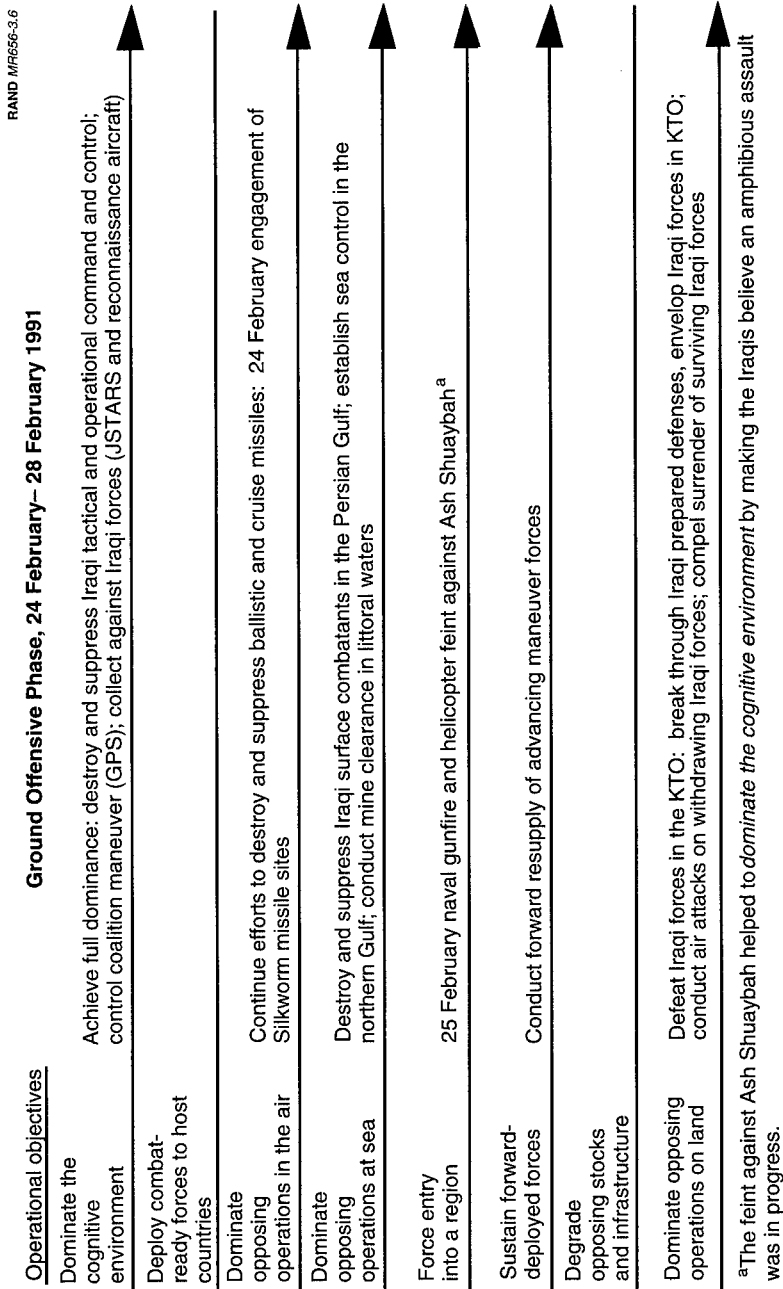


Figure 3.6—Ground Offensive Phase

Aerospace supremacy and sea control coupled with real-time intelligence allowed coalition air forces to destroy Iraqi maneuver forces out of contact as they attempted to withdraw or simply flee. In addition, coalition aircraft attacked Iraqi forces trapped south of the marshlands near the Euphrates River because bridges and causeways had been damaged. The destruction of these forces was due to the synergism of ground maneuver and air attack. During the air phase, Iraqi maneuver forces had been dispersed and protected by field fortifications from all except direct hits. When they tried to withdraw during the ground phase, Iraqi maneuver forces became concentrated and were no longer protected. However, the successful air attacks had an unintended consequence. Extensive media reporting on the interdiction of Iraqi forces fleeing north of Al-Jahra (Mutla Ridge) created a false impression of wanton killing that caused pressure on USCINCENT to accept an early cease-fire.⁵⁹

Amphibious assault during the ground phase involved a feint against Ash Shuaybah, employing helicopters, naval gunfire, and a deception operation by SEAL teams. Iraqi maneuver forces on the littoral failed to deploy against advancing Marine forces during the brief opportunity still remaining. It is unclear whether these forces were pinned by the coalition's amphibious threat or failed to respond for other reasons.

Breakthrough operations on 24–25 February proved much less difficult than feared. The minefields were thin, often exposed because of drifting sand, and generally not covered by fire. The fire trenches were unused or ineffective. Iraqi artillery fire was sparse and apparently not controlled by forward observers. Moreover, coalition counter-battery fire delivered by fixed-wing aircraft, attack helicopters, MLRS, and cannon was extremely effective. The Iraqis did not attempt to use chemical munitions, and they usually failed to commit their mobile reserves against the attackers emerging from the breeches. U.S. Marine forces advancing through Kuwait preceded their attack by a large-scale infiltration of the Iraqi defensive positions. Enjoying the advantage of operational surprise, VII Corps

⁵⁹Cohen, 1993a, pp. 50–52; Schwarzkopf, 1992, p. 468; Powell, 1995, p. 521–522.

attacked through very thinly defended positions. Iraqi troops usually offered token resistance before surrendering in large numbers.

The flanking maneuver and near envelopment conducted by VII Corps caught the Iraqi commanders by surprise. They were conditioned by the Iran-Iraq war to expect protracted battles of attrition on a continuous front rather than breakthrough and rapid exploitation. Even had they understood the situation, their qualitative inferiority and complete lack of air support made them unable to respond effectively. On 26 February, Saddam Hussein ordered his mobile forces to withdraw. USCINCENT continued to press the offensive with the intention of reaching the Persian Gulf north of Kuwait and completely enveloping the Iraqi maneuver forces still remaining in the KTO. Believing that this objective was practically accomplished, he agreed to a hasty cease-fire that allowed some Republican Guards units to escape.

The ground phase was as one-sided as the preceding air phase. The Iraqis suffered catastrophic equipment losses and fairly heavy personnel losses, while coalition forces had few losses of any kind. To some extent, this gross disparity is attributable to technological superiority. For example, during the battle of 73 Easting on 26 February, the 2nd Armored Cavalry Regiment used thermal imaging to penetrate a dust storm and destroyed Iraqi tanks at ranges far beyond Iraqi capability to acquire targets. But the overwhelming coalition advantage was at the operational level of war, embodied in rapid, violent maneuver that defeated all Iraqi forces in the KTO while engaging only a few.

COGNITIVE DOMINANCE A KEY OBJECTIVE

Expressions such as “C³I,” “information war,” and even “command and control warfare” do not capture the full dimensions and importance of dominating the cognitive environment. Cognitive dominance is not an intelligence function nor the province of specialists in electronics. The struggle for cognitive dominance is inherently two-sided, involves a wide variety of combat actions, and can have decisive effects. It is waged at every level of war from strategic decisions to individual encounters in combat. At the operational level, cognitive dominance should be a major focus of command interest and thoroughly integrated into operational planning.

This objective should not be envisioned as satellites spinning through a silent void, nor as computers humming softly as they process unimaginable amounts of data, nor as graphic displays that give war the aspect of a video game. Rather, it should be envisioned as U.S. commanders in full mastery of complex situations confronting enemy commanders who know little of U.S. operations and are losing control over their own forces. It should be envisioned as U.S. commanders who see almost perfectly overmatching enemy commanders who are nearly blind. For example, it should be envisioned as General H. Norman Schwarzkopf confronting the Iraqi officers at Safwan. Cognitive dominance could be a key objective for U.S. commanders, especially if their forces are outnumbered in some future contingency.

EXPLOITATION OF ADVANTAGES

An objectives-based approach focuses attention on command decisions that create and exploit advantages. Few wars of any kind, and no wars that involve U.S. forces, will be decided by linear battles and attrition. On the contrary, U.S. commanders will normally select objectives and sequence accomplishment to exploit their own strengths and enemy vulnerabilities. Far from being chivalrous, they will ruthlessly exploit every advantage within the bounds of international law and constraints set by the national command authority.

The Persian Gulf campaign can be understood as a series of stratagems to negate the only important Iraqi strength: large numbers of heavy ground forces. Initially, the coalition exploited its dominance at sea to blockade Iraq, enforcing economic sanctions imposed by the Security Council. After ensuring the defense of Saudi Arabia, the coalition exploited dominance in the air to destroy targets throughout Iraq and Kuwait with increasing concentration on Iraqi ground forces. The coalition easily repulsed an Iraqi attack that may have been intended to precipitate a ground war prematurely. Finally, the coalition dominated land operations by outflanking Iraqi forces in Kuwait¹ and preventing their reinforcement. In these ways, the coalition exploited its advantages while denying Iraq opportunities to employ its heavy ground forces.

OTHER APPLICATIONS OF AN OBJECTIVES-BASED FRAMEWORK

The approach developed in this report has other applications than for campaign analysis. In fact, several previous² and ongoing proj-

¹U.S. 1st and 2nd Marine Divisions, reinforced by an armored brigade, attacked straight to Kuwait City through the heart of the Iraqi defenses while suffering only slight casualties. This experience indicates that the coalition ground offensive would have enjoyed complete and rapid success using practically any scheme of maneuver. But USCINCENT could not have known prior to the event that Iraqi forces would surrender so easily. His flanking maneuver ensured that they would be at an extreme disadvantage no matter how they responded.

²See Kent, 1983; Warner and Kent, 1984; Kent, 1989; Kent and Simons, 1991; and Schrader et al., 1996. An earlier expression for this approach was "strategy to tasks." More precisely speaking, the approach is "objectives based." Strategy is a highest-level vision of unfolding events, including enemy initiatives and responses. Strategy

ects within RAND have used an objectives-based approach. Applications include

- analyzing campaigns (focus of this study)
- developing strategy
- preparing war plans
- allocating resources
- modernizing forces.

Developing Strategy

Strategists set the highest-level objectives and envision how to accomplish them. To understand what can be accomplished through military force, they must look at the underlying operational level, normally through the professional advice of the CJCS and combatant commanders. In several instances, including Desert Storm,³ the link between strategy and operational art has been weak. It would be strengthened if civilian and military leaders shared a common understanding of objectives.

Preparing War Plans

War plans are designed to implement strategy within a political-military context bounded by the assumptions. War planners derive their overall objectives from national strategy, but they must look at the underlying tactical level to evaluate feasibility. While planning at the operational level, they must comprehend objectives (and capa-

defines how objectives at several levels (national security objectives, national military objectives, missions of combatant commanders) are set and attained.

³The decision to unilaterally terminate the ground offensive before completing the encirclement of Iraqi forces will long remain controversial. An underlying question is whether U.S. decisionmakers were fully clear about objectives. Was USCINCCENT expected to destroy the Iraqi Republican Guards or merely to evict Iraqi forces from Kuwait? If the latter, then the encirclement should have been left open to facilitate their escape. If the former, then the ground offensive should have continued for several additional days. See Powell, 1995, pp. 521–528; and Schwarzkopf, 1992, pp. 465–472.

bilities) at levels above and below their own; in other words, they need a comprehensive understanding of a hierarchy of objectives.

Allocating Resources

Resource allocation decisions reflect informed judgment on the most cost-effective and prudent way to allocate scarce resources among competing defense programs. These decisions are affected by such considerations as preservation of an industrial base, effect on the nation's economy, and sunk costs, which are not directly related to military operations. But the fundamental rationale is to provide capabilities needed to accomplish tasks and to attain objectives.⁴

Modernizing Forces

Strategic planners set the demand for modernization by identifying operational requirements. To fulfill these requirements, joint and service conceivers frame concepts at the operational level, the tactical level, and the level of weapons systems (tanks, ships, aircraft, etc.).⁵ Top-level decisionmakers evaluate competing concepts and decide which concepts to implement, implying program starts and

⁴See Schrader et al., 1996, for application of an objectives-based approach to resource management at the unified-command level. There is some divergence in terminology between the present report, reflecting very recent consensus within RAND, and Schrader et al., 1996. "Fundamental national goals," outlined in the present report, are assumed in Schrader et al., 1996. "National security objectives" equate to "national security strategy" and "national military objectives" equate to "national military strategy." "Missions of combatant commanders" in the present report encompass "regional military objectives" (at PACOM level) and "theater operational objectives" (at USFK level) in Schrader et al., 1996. "Operational objectives" in the present report correspond to "operational tasks to achieve specific objectives" in Schrader et al., 1996. "Tasks" in the present report correspond to "capabilities" or to "joint operational tasks" that were developed by merging "operational tasks" and "capabilities."

⁵At the weapons-system level, conceivers explore the technical possibilities of new weaponry and advantages that modernization will confer in one-on-one and many-on-one engagements. At the tactical level, they devise concepts to employ new weapons systems effectively, including acquisition of targeting data, and associated command and control. At the operational level, they envision how projected capabilities will contribute to attaining objectives in the context of joint and combined operations.

initial resource allocation decisions. The fundamental rationale is to improve capability to accomplish objectives.

TERMINOLOGY

This appendix defines key terms used in the report in Table A.1. For each term, the table presents authoritative definition(s) promulgated by the Joint Chiefs of Staff for the armed services; relevant statements in doctrinal publications of the U.S. Army, Air Force, and Marine Corps; dictionary entries to show origin and common usage; and study definition(s). In cases of multiple study definitions, the initial entry applies unless otherwise stated.

Several terms are not crisply defined or have multiple definitions that can cause confusion. Among these terms are “mission” and “operation.” Joint Publication 0-2 (CJCS, 1995) presents “mission” as a task assigned by the national command authority to combatant commanders, but Joint Publication 1-02 (CJCS, 1994a) recognizes that in common usage “mission” has a very wide field of meaning. Indeed, the word is used by military officers and civilians alike in reference to practically anything that armed forces are expected to accomplish, from their enduring functions set forth in law (roles and “missions”) to the lowest-level tactical action. Such promiscuous usage is harmless when the intended meaning is clear in context. Surprisingly the term “operation” lacks crisp definition even in Joint Publication 0-2 (CJCS, 1995); yet the “operational level of war” is clearly defined and well understood. Like “mission,” it would seem that “operation” can be used promiscuously without harm so long as the meaning is clear in context.

None of these terms refers to a phenomenon that has exact boundaries in reality. For example, there are no precise dividing lines among the three levels of war (strategic, operational, tactical) nor

among the cognitive activities at each level (strategy, operational art, tactics). But such imprecision does not imply that these distinctions are not useful. At this level of abstraction, exact boundaries in the real world would be very surprising.

Table A.1
Definitions of Key Terms

Term	Joint Definition	Army/AF/USMC Statements	Dictionary Entries	Study Definition
objective	The physical object of the action taken, e.g., a definite tactical feature, the seizing and/or holding of which is essential to the commander's plan (CJCS, 1995, p. 271).	Direct every military operation toward a clearly defined, decisive, and attainable objective (U.S. Army, p. 2-4). Direct military operations toward a defined and attainable objective that contributes to strategic, operational, or tactical aims (U.S. Air Force, 1992, p. 10). To win, we must concentrate combat power toward a decisive aim (U.S. Navy, 1989, p. 35).	[Latin <i>objectus</i> , a casting before, from <i>ob-</i> and <i>jacere</i> , to throw] (1) anything external to or independent of the mind. (2) something aimed at or striven for (McKechnie, 1979).	Intended outcome.

Table A.1—continued

Term	Joint Definition	Army/AF/USMC Statements	Dictionary Entries	Study Definition
mission	<p>Missions are the tasks assigned by the President or Secretary of Defense to the combatant commanders (CJCS, 1995, p. viii).</p> <p>(1) The task, together with the purpose, that clearly indicates the action to be taken and the reason therefor (2) In common usage, especially when applied to lower military units, a duty assigned to an individual or unit; a task (3) The dispatching of one or more aircraft to accomplish one particular task (CJCS, 1995, p. 245).</p>	<p>The mission is the commander's expression of what the unit must accomplish and for what purpose (U.S. Army, p. 6-6).</p> <p>Missions define specific tasks, not capabilities or organizations (AFM 1-1, Vol. I, p. 6).</p>	<p>[Latin <i>missio</i>, a sending] (1) sending out or being sent with authority to perform a special duty (10) in military usage, a specific combat operation assigned to an individual or unit; especially a single combat flight by an airplane or group of airplanes (McKechnie, 1979).</p>	<p>(1) Intent of national command authority communicated to combatant commanders (2) [common usage] Overall objective at any level of military effort (3) Fundamental concern of a Military Department (4) Tactical actions of air elements.</p>

Table A.1—continued

Term	Joint Definition	Army/AF/USMC Statements	Dictionary Entries	Study Definition
concept of operations	Verbal or graphic statement, in broad outline, of a commander's assumptions or intent in regard to an operation or series of operations. The concept of operations frequently is embodied in a campaign plan and operations plans. It is included primarily for additional clarity of purpose (CJCS, 1995, p. 86).	The operational or tactical concept of operations describes how Army commanders visualize the major operation and battle unfolding. The concept is based on the commander's selected course of action to accomplish the mission, expressing <i>what</i> , <i>where</i> , and <i>how</i> the force will affect the enemy (U.S. Army, p. 6-6).	concept: [Latin <i>conceptus</i> , a collecting, gathering, a thought, from <i>concupere</i> to take in] an idea, especially a generalized idea of a class of objects; a thought; general notion.	Commander's view of how to accomplish his mission or to attain an associated objective.

Table A.1—continued

Term	Joint Definition	Army/AF/USMC Statements	Dictionary Entries	Study Definition
strategy	The art and science of developing and using economic, psychological, and military forces as necessary during peace and war to afford the maximum support to policies, in order to increase the probabilities and favorable consequences of victory (CJCS, 1995, p. 364).	<p>Strategy is concerned with national or, in specific cases, alliance or coalition objectives (U.S. Army, 1993, p. 1-3).</p> <p>The most crucial challenge for the military strategist lies in understanding the character of the imminent or occurring conflict and devising strategic military objectives that, once gained, will create the conditions necessary to achieve the political purpose (U.S. Air Force, 1992, p. 45).</p>	[Greek <i>strategia</i> , generalship] (1) science of planning and directing large-scale military operations (2) plan or action based on this (3) skill in planning or managing (McKechnie, 1979).	Vision of events that would advance national interests or accomplish national objectives.

Table A.1—continued

Term	Joint Definition	Army/AF/USMC Statements	Dictionary Entries	Study Definition
operational art	The employment of military force to attain strategic and/or operational objectives through the design, organization, integration, and conduct of strategies, campaigns, major operations and battles (CJCS, 1995, p. 274).	Operational art seeks to ensure that commanders use soldiers, materiel, and time effectively to achieve strategic aims through campaign design (U.S. Army, p. 6-2). The essence of aerospace operational art is the planning and employment of aerospace forces to maximize their contribution to the combatant commander's intent (U.S. Air Force, 1992, p. 129).	art: [Latin <i>ars</i> , root; <i>ar</i> , to join] (1) the disposition or modification of things by human skill, to answer the purpose intended.	Doctrinal precepts and professional judgment applied to the conduct of campaigns and major military operations.

Table A.1—continued

Term	Joint Definition	Army/AF/USMC Statements	Dictionary Entries	Study Definition
tactics	(1) The employment of units in combat (2) The ordered arrangement and maneuver of units in relation to each other and/or to the enemy to use their full potentialities (JP-1-02, p. 378).	<p>Art and science of employing available means to win battles and engagements (U.S. Army, Glossary).</p> <p>Tactics can be thought of as the art and science of winning battles and engagements. It includes the use of firepower and maneuver, the integration of different arms, and the immediate application of success to defeat the enemy (U.S. Navy, 1989, p. 23).</p>	<p>[Greek <i>taktika</i>, matters of arrangement] (1) the science and art of disposing military and naval forces in action or before the enemy (2) actions in accord with this science; hence any skillful management for affecting a desired result (McKechnie, 1979).</p>	Methods and techniques of combat.

Table A.1—continued

Term	Joint Definition	Army/AF/USMC Statements	Dictionary Entries	Study Definition
strategic level of war	The level of war at which a nation, often as a member of a group of nations, determines national or multinational (alliance or coalition) security objectives and guidance, and develops and uses national resources to accomplish these objectives (CJCS, 1995, p. 363).	The strategic perspectives are worldwide and long-range (U.S. Army, p. 1-3). At the strategic level of war, military and civilian leaders determine crucial priorities between theaters and service efforts, set the focus of military operations, and define the military goals necessary to achieve political objectives (U.S. Air Force, 1992, p. vii).	[None]	Perspective of the highest level decision-makers responsible for conduct of war, typically the head of state and his military advisors, acting nationally or within an alliance or coalition.

Table A.1—continued

Term	Joint Definition	Army/AF/USMC Statements	Dictionary Entries	Study Definition
operational level of war	The level of war at which campaigns and major operations are planned, conducted, and sustained to accomplish strategic objectives within theater or areas of operations. Activities at this level link tactics and strategy by establishing operational objectives (CJCS, 1995, p. 275-6).	At the operational level of war, joint and combined forces within a theater of operations perform subordinate campaigns and plan, major operations and plan, conduct, and sustain to accomplish the strategic objectives of the unified commander or higher military authority (U.S. Army, p. 6-2). The operational level of war is concerned with employing military forces in a theater of war or theater of operations (U.S. Air Force, 1992, p. 129).	[None]	Perspective of high-level military commander conducting a campaign or major military operation; usually involves extensive planning and logistic support.

Table A.1—continued

Term	Joint Definition	Army/AF/USMC Statements	Dictionary Entries	Study Definition
tactical level of war	The level of war at which battles and engagements are planned and executed to accomplish military objectives assigned to tactical units or task forces. Activities at this level focus on the ordered arrangement and maneuver of combat elements in relation to each other and the enemy to achieve combat objectives (CJCS, 1995, p. 376).	At the tactical level of war, battles and engagements are planned and executed to accomplish military objectives assigned to tactical units or task forces (U.S. Army, p. 6-3). The tactical level translates potential combat power into success in battles and engagements through decisions and actions that create advantages when in contact or in proximity to the enemy (U.S. Air Force, 1992, p. 47).	[None]	Perspective of commanders and others fighting battles and engagements; may involve minimal planning and only ammunition and supplies on hand.

Table A.1—continued

Term	Joint Definition	Army/AF/USMC Statements	Dictionary Entries	Study Definition
campaign	A series of related operations aimed at accomplishing a strategic or operational objective within a given time and space (CJCS, 1995, p. 60).	A <i>campaign</i> is a series of related operations designed to achieve strategic objectives within a given space and time. A campaign plan describes how these operations are conducted (U.S. Army, p. 6-3).	[Latin <i>campus</i> , a field] (1) a series of military operations with a particular objective (McKechnie, 1979).	Set of operations, typically accomplished in phases, to accomplish the mission of a combatant commander or an associated objective.

Table A.1—continued

Term	Joint Definition	Army/AF/USMC Statements	Dictionary Entries	Study Definition
operation	A military action or the carrying out of a strategic, tactical, service, training, or administrative military mission; the process of carrying on combat, including movement, supply, attack, defense, and maneuvers needed to gain the objectives of any battle or campaign (CJCS, 1995, p. 274).	<i>Major operations</i> consist of coordinated actions in a single phase of a campaign and usually decide the course of a campaign (U.S. Army, p. 6-3).	[Latin <i>operatio</i> , work] (5) (a) any movement or series of movements made in carrying out strategic military plans. (b) any specific plan or project (McKechnie, 1979).	(1) Large-scale employment of military forces to attain an objective (2) [common usage] Almost any military activity.

Table A.1—continued

Term	Joint Definition	Army/AF/USMC Statements	Dictionary Entries	Study Definition
battle	[no entry in CJCS, 1995.]	<p>A battle consists of a series of related engagements; it lasts longer than an engagement, involves larger forces, and could affect the course of a campaign. Battles occur when division, corps, or army commanders fight for significant objectives (U.S. Army, p. 6-3).</p> <p>A battle is an extensive tactical fight between sizeable combat forces. Battles generally last days, sometimes weeks. They occur when adversaries commit to fight to a decision at a particular time and place for a significant objective (U.S. Navy, 1989, p. 24).</p>	<p>[Middle English <i>batel</i>, <i>batelle</i>, from Old French <i>bataille</i>, from Latin <i>batuere</i>, to beat, to fight] (1) a fight, especially a large-scale engagement between armed forces on land, at sea, or in the air (2) armed fighting; combat or war (McKechmie, 1979).</p>	Large-scale combat involving multiple engagements.

OPERATIONAL OBJECTIVES AND TASKS

This appendix presents a comprehensive list of operational objectives and associated tasks. It was generated from doctrinal publications of the armed services, research into the Persian Gulf campaign, results of previous RAND research, and discussions with RAND colleagues. The objectives and tasks used as a framework to analyze the Persian Gulf campaign in this report were selected from this list.

COMBAT-RELATED OPERATIONAL OBJECTIVES

Counter Opposing WMD

- Degrade U.S. target value for opposing WMD.
- Ensure U.S. ability to operate in WMD environment.
- Ensure survivability of U.S. nuclear weapons and their control.
- Defend the United States against opposing attacks using WMD.
- Deter use of opposing WMD through credible threat of retaliation.
- Suppress and destroy opposing WMD.
- Disrupt opposing command and control of WMD.

Deny Opposing Operations in Space and Exploit Space at Will

- Launch satellites.

- Control satellites in orbit.
- Suppress and disrupt opposing space operations.
- Provide early warning of missile launch.
- Support communications.
- Provide environmental monitoring.
- Provide navigation and geopositioning data.
- Support attack assessment.

Dominate Opposing Operations in the Air

- Defeat opposing attacks in friendly air.
- Suppress and destroy opposing ballistic missiles.
- Suppress and destroy opposing cruise missiles.
- Suppress and destroy opposing air defenses.
- Degrade sortie rates of opposing aircraft.
- Destroy opposing aircraft in flight.

Dominate Opposing Operations at Sea and Exploit Sea at Will

- Deny opposing use of ports and roadsteads.
- Destroy opposing surface combatants.
- Destroy opposing submarines.
- Lay mines and neutralize opposing mines at sea.
- Defeat air attacks on friendly naval forces.
- Secure sea-lanes for friendly use.
- Interdict and control maritime traffic.

Dominate Opposing Operations on Land and Operate at Will

- Fix and destroy opposing land forces in operational depth.

- Repel opposing attacks on land.
- Maneuver friendly forces into advantageous position.
- Destroy opposing land forces in contact with friendly forces.
- Pursue and destroy opposing forces in retreat.
- Evict opposing forces and secure key terrain.
- Maintain rear area security.

Degrade Opposing Stocks and Infrastructure

- Disrupt opposing communications.
- Disrupt opposing power generation.
- Disrupt opposing transportation.
- Degrade opposing stocks of war-related products.
- Degrade opposing output of basic industrial goods.

Force Entry into a Region

- Conduct opposed amphibious landing.
- Conduct opposed heliborne assault.
- Conduct opposed airborne assault.

Protect Lives of U.S. Citizens Abroad

- Defend U.S. citizens under attack.
- Evacuate endangered U.S. citizens.
- Rescue U.S. citizens held hostage.

Counter Terrorists Acting Against the United States and Its Allies

- Interdict illegal movement of persons and weapons into the United States.
- Protect civilian targets from terrorist attack.
- Protect forces and installations from terrorist attack.
- Destroy terrorist bases and infrastructure.
- Recover hostages.

Participate in Noncoercive Peace Operations (Chapter VI)

- Observe, report, and resolve violations of agreements.
- Interpose force to control a buffer zone.
- Secure electoral activities.
- Assist in maintaining civil order.
- Assist in mine clearance.
- Help to repair damaged infrastructure.
- Support activities of nongovernmental organizations.

Participate in Coercive Peace Operations (Chapter VII)

- Secure delivery of humanitarian aid.
- Control movement within and across borders.
- Establish and protect safe areas for civilians.
- Enforce cease-fire, disengagement, and arms limitations.
- Suppress and destroy forces of recalcitrant parties.

COMBAT-SUPPORTING OPERATIONAL OBJECTIVES

Dominate the Cognitive Environment

- Formulate operational concepts and doctrine.
- Collect information on friendly forces.
- Acquire intelligence on opposing forces.
- Develop friendly situational awareness.
- Disrupt and distort opponent's information and intelligence.
- Reduce will of opponent to fight.

Enhance Capabilities of U.S. Friends and Allies

- Provide weapons and equipment.
- Train friendly and allied forces.
- Maintain military-to-military contacts.
- Conduct combined exercises.
- Help combat insurgency against friendly regimes.
- Support insurrection against hostile regimes.

Maintain Peacetime Military Presence

- Forward deploy maneuver forces in peacetime.
- Conduct naval deployments and port calls.
- Establish patterns of air deployment.
- Maintain prepositioned unit equipment sets.
- Maintain prepositioned supplies and equipment.
- Conduct joint exercises.

Deploy Combat-Ready Forces to Host Countries

- Deploy air forces.
- Deploy naval forces.
- Deploy special operations forces.
- Deploy light maneuver forces.
- Deploy heavy maneuver forces.
- Mobilize the National Guard and reserve forces.

Establish an Effective Coalition

- Negotiate combined command and control arrangements.
- Provide common communications.
- Establish C³I entities.
- Exchange liaison elements.
- Exercise combined control arrangements.

Establish Infrastructure to Sustain Forward-Deployed Forces

- Obtain host nation support.
- Develop airports.
- Develop seaports.
- Provide storage and maintenance facilities.
- Establish lines of communication.
- Establish forward supply bases.
- Support military operations through civil affairs.

Sustain Forward-Deployed Forces

- Provide ammunition and munitions.

- Provide petroleum products, rations, and other expendables.
- Provide replacement weapons and equipment.
- Provide replacement personnel.
- Establish theater-level maintenance.

OTHER OPERATIONAL OBJECTIVES

Provide Humanitarian and Disaster Relief at Home and Abroad

- Provide emergency medical care.
- Provide food and potable water.
- Provide temporary shelter for homeless civilians.
- Help to reconstitute civilian administration.

Counter Production and Traffic in Illegal Drugs

- Produce intelligence on production and traffic in illegal drugs.
- Assist states in suppressing production and traffic.
- Interdict importation of illegal drugs into the United States.

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